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A Review of Modern
Cost-Finding Systems

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A REVIEW OF MODERN COST-FINDING SYSTEMS

BY

Jean Howard Knox

THESIS FOR THE DEGREE OF BACHELOR OF SCIENCE
IN MECHANICAL ENGINEERING

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THIS IS TO CERTIFY THAT THE THESIS PREPARED UNDER MY SUPERVISION BY

JEAN HOWARD KNOX

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IS APPROVED BY ME AS FULFILLING THIS PART OF THE REQUIREMENTS FOR THE DEGREE

OF Bachelor of Science in Mechanical Engineering

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HEAD OF DEPARTMENT OF Mechanical Engineering

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A REVIEW OF MODERN SYSTEMS
OF
COST KEEPING

THE FOLLOWING OUTLINE WILL BE FOLLOWED IN THIS DISCUSSION OF COST KEEPING.

I.

INTRODUCTION:

UNDER THIS HEAD WILL BE GIVEN (a) SHORT HISTORY OF COST ACCOUNTING SYSTEMS AND COST KEEPING (b) OBJECT OF THIS DISCUSSION (c) INDEX TO WORKS OF REFERENCE ON THIS SUBJECT.

II.

A. INDEX OF TERMS USED IN COST FINDING SYSTEMS IN MANUFACTURING, AND DEFINITIONS.

B. TYPES OF COST KEEPING IN GENERAL USE.

C. MECHANICAL AIDS IN COST KEEPING IN THE FACTORY.

III.

DESCRIPTION OF COST KEEPING SYSTEMS ENTERED IN THIS DISCUSSION.

IV.

CONCLUSION:

UNDER THIS HEAD CONCLUSIONS WILL BE DRAWN AND A GENERAL FACTORY COST KEEPING SYSTEM OFFERED.

I.

INTRODUCTION

(a) Cost keeping in its broadest sense began when man first set a value on property owned by him. This value of an article was measured by its usefulness to himself and the possibility of exchange for some other article. Little was thought of itemizing cost of various articles in the early centuries and we may truthfully say that cost accounting and cost keeping in the sense it is now used, began when manufactured products were put on the market in exchange for a medium, money.

"Profit Sharing was introduced in France and England about 1870" The Profit Sharing plan is nearly coincident with the present Co-operative System, in which the employor and employee, manufacture, sell, and share alike, the one receiving as much as the other. The Co-operative System is fairly good for very small industries but the progress of the times adjusts conditions otherwise and this system can never rise to the plane of business with the modern corporations and consolidated companies.

There are two conditions to be fulfilled in determining value or cost of a thing, first, the thing must exist in its raw state and be capable of handling and control, second, human labor, necessary for the production of a thing, must be considered.

In regard to faw material fit for manufacture, its cost in the finished product will depend upon its usefulness to society and upon the difficulty of converting the raw material into finished product.

Arnold says, "Labor duration measures commercial exchange values". This means the value of an article depends upon the amount of labor and the time to produce an article. This is true but covers but one, though a very important, phase of the question of value or cost of an article, that of means of production.

It is within the last twenty five years that manufacturers have given closest attention to cost details, being driven to this by the ever increasing competition among industries of the same kind, and the merging of factories and companies to lessen cost by greater production in manufacturing.

The "cut and try method" of manufacture in which the only object is to get the product on the market without regard to small details in cost, is almost a thing of the past in modern manufacture.

The present manufacturer must account for all scrap, all non-productive labor such as sweeping, erecting machines to be used, all productive labor, in fact he must record time on producing a single bolt, both for the machine and tools used and the time the workman is employed on the job.

The manufacturer who is even a fraction of one per cent higher than his competitor in the cost of the same class of product must necessarily take second place or sell out to his more competent competitor.

Probably the foremost man in cost keeping systems in America is Mr. James Newton Gunn, of Boston, who has installed a great many successful cost accounting systems in big American plants, and who is one of the best posted students on the economics of cost finding.

This discussion contains many of his suggestions, taken from "The Complete Cost Keeper" by Mr. H. L. Arnold. We estimate "The Complete Cost Keeper" as a most valuable reference for anyone who desires to acquaint himself with systems used now in several successful establishments. This book is published by "The Engineering Magazine", New York. Mr. C. J. Watts has written several columes on "The Cost of Production", published by the Shaw-Walker Company, Muskigon, Michigan, also the System Company of Chicago have published a set of works by different authors on the cost of production; these all dealing in a general way with the problem of cost accounting in manufacturing and offer much valuable information along this line.

Reference is made to "The System Magazine, of Chicago, Illinois, which magazine can be had in bound volumes for any period desired. It is thought that Mr. C. E. Woods, E. E., M. E. has offered the strongest arguments on cost accounting in manufacturing, having treated this subject in a thoroughly scientific manner; volumes one to seven inclusive for the year 1905. Mr. Woods has published the following articles:

I. The Prime Organization Elements of an Industrial Body.

II. Graphic Records of Expense.
III. Graphic Records of Labor, Output, and Sales.
IV. Keeping Records of Factory and Office Employees.
V. How to Stop Leaks in the Factory.
VI. Keeping Track of Earning Power of, and Depreciation on, Machine, Tools, and Equipment.
VII. Factory Production Cost.
VIII. The Machinery of Cost Getting.
IX. Departmental Authorities of the Factory.
X. Perpetual Inventories.
XI. Departmental Authorities of the Office.

The Engineering Magazine of New York City has published many valuable articles on subjects pertaining to cost keeping and reference is made to the following numbers; volumes 19 to 45 inclusive from 1900 to 1907, including the following subjects among others:

Volume 20 - Cost Keeping.
Volume 22 - The Classification and Analysis of Shop Charges.
Factory and mass Production and the New Machine Rate.
Volume 25 - Cost Reduction by the Use of the Premium Plan.
A Remodeled Piece-work System.
Volume 26 - The Fixing of Piece-work Rates.
etc., etc.

The following manufacturing plants have very kindly furnished us with various record and cost forms used by them: Western Electric Company, Chicago, Illinois. Root and Van-

dervort, East Moline, Illinois., The International Harvester Company, Chicago, Illinois, and A. L. and Company, Springfield, Illinois.

Thanks are due Mr. W. M. Reay, of the International Harvester Company, and to Mr. E. J. Kealy, of the Western Electric Company, for many valuable suggestions on this subject of cost accounting.

The object of this discussion on Modern Systems of Cost Keeping is to discuss the pertinent points of present day cost keeping in the factory and offer such information as has been given by the best authors on this subject, to the end that one may devise a general factory system of cost keeping to suit any plant.

The record blanks and cost forms herein contained and described are taken from prosperous establishments and a study of them will show the points necessary for a complete cost keeping system.

II.

(a)

INDEX OF TERMS USED IN MANUFACTURING, AND DEFINITIONS.

The terms used in the manufacturing fields to designate specific objects, places, kind, are absolutely essential for full understanding of any business.

"FACTORY" means the entire group of buildings if more than one building, that is devoted to the production of finished product. "SHOP" is a term given to any particular branch or department exclusive in itself from any other departments; for example, "pattern shop" is the department where the patterns for the various machine parts are made, and "machine shop" is the department in which the parts of any article are worked into shape by the use of lathes, planers, or special machines. Also the word "mill" is often used for a certain factory as a "steel rail mill" or a "brass mill". So is the term "works" often used in this connection, as the "The Niles Tool Works," etc.

Orders from the head office to the factory are termed "work order", "work slip", etc., and are called "PRODUCTION ORDERS", and a "work order" that passes from one shop to another is termed a "sub-production Order". If the cost items of an article may be charged directly on the face of a "Production Order," it is called a "Collective Production Order," and if the original order is so constructed that sub-orders may be attached and finally form a complete order it

is designated as a "Composite Production Order."

Manufacturers must keep their trade secrets intact and so many terms and names are used which have a particular meaning only to the producer, thus cryptograms or written expressions having a hidden meaning different from the commonly understood significance of the words or phrases of a group. Symbols or short form of words of description or figures are used almost entirely in factories and shops. These symbols are made especially for private use in the shop and factories. Each machine, each piece of the different parts of a machine receives in the drawing, casting, and finished piece, a simple numerical symbol, thus "M-160-3-10" might mean the cross head belonging to steam engine number 160. Workmen in the shops at once adopt the symbols for the names of the article themselves.

The best known form of shop symbolizing is known as the "Dewey Decimal System" of cataloging, because this system is general, expansive, and can be made to cover any number of pieces without change of symbols previously used. Symbolizing and cataloging is the only perfect modern way of indexing and numbering a stock, and by its use much labor and expense, both in cataloging, and in filling orders, is saved.

Following are definitions of general cost terms:

COST. - That which is paid for a thing.

FLAT COST. - "Prime cost", or material and labor cost in producing an article in a factory.

TOTAL COST. - The entire cost of producing a "finished article", and including the flat cost and cost incidental

toward running the factory and per cent of value depreciation in factory fittings.

Stock is divided under different heads;

ROUGH STORES: The "raw material" which goes toward making the "finished product"; it includes everything that is to form a part of some future article or machine, and may and does include, wire, sheet metal, springs, or other completed parts, purchased outside this particular shop or factory.

ROUGH STORES KEEPER: The person in charge of the "rough stores room".

FINISHED STORES: All factory product ready for sale or ready to be assembled; kept in the "finished stores room" and under the charge of the "Finished Stores Keeper" or "Shipping Clerk".

STOCK: All articles or material ready for sale or ready for assembling, etc.

To be familiar with the terms used in keeping a cost account it is necessary to make a furthur outline of these items.

ADVERTISING. Expense incurred in publishing cards, pamphlets, catalogues, advertising through the press, and exhibits.

ASSETS. Total property and invested capital.

BALANCE SHEET. Complete summary of debit and credit up to a certain date, and covering a definite period of time.

COMMERCIAL BOOKS. All books pertaining to general office accounting, as ledger, journal, cash books, as distinguished from the stock books of the factory.

CONTRACTS. Accounts of which the firm is a party thereto and necessitating expense of sale and installation of finished product.

CONTRACT ACCOUNT BOOK. Kept with commercial books and holding a record of contracts and terms of sale along with description of articles to the contract.

COST OF PRODUCTION. Which includes prime cost and makes a total cost or expenditure in placing finished product in hands of buyer or vendee.

DEPRECIATION. Time loss in value of plant, buildings, machinery, and other assets.

LAW EXPENSE. Fees paid for legal advice and protection.

FACTORY ACCOUNTING. Relates to all accounts kept in factory departments.

FACTORY PAY ROLLS. Head under which comes payment of employees and method of employment.

FIXED PLANT. Includes property of the firm, plant, and permanent fixtures, such as machinery and accessories.

FLOATING PLANT. Includes machinery and tools for use in installation of sale product.

FIXTURE ACCOUNT. All fixtures, machinery, accessories, used in plant and coming under head of assets of the firm.

FUEL ACCOUNT. Account showing amount, kinds, and cost per ton, and total cost of fuel used by the firm.

GENERAL CHARGES. Which include "profit and loss" account or charges and expenses which cannot be charged directly to any branch or department. Usually, though, this expense account goes for rebates or corporation donations and is charged to the law account, advertising, or rebates for damaged stock.

GOODWILL. Value of established trade or patronage and comes under the head of assets of a firm.

INSTALLATION WAGE RECORD. Expenses account of department of installation.

JIGS AND TEMPLETS. Includes finished petterns and all tools used in factory departments.

JOB. Number or name of finished article after being placed upon the market and sold.

LIGHT ACCOUNT. Includes expense of lighting plant and buildings of the firm.

MATERIAL. Which includes "raw" and "finished" material and comes under factory assets.

MATERIAL--ISSUED BOOK. Account books of amount, kinds, and value of stock material.

ORDER. An instruction to supply a certain article or work.

ORDERS ACCOUNT BOOK. Inventory of all orders received and their nature and description/

OPERATING PAY-ROLL. Account and system of payment of employees in factory and plant.

STOCK. Includes all material for use in manufacture of product for sale. This includes:

Scrap - Waste material having value.

Stores - Covers stock and material.

Tools - Instruments used in plant but not fixtures.

UNPRODUCTIVE MATERIAL. Material disbursed, but not charged to any specific order. Where labor and material are not entered in prime cost of any article, it is classed as unproductive material.

TIME BOOK. Record of time employed by laborers, time of producing an article

-----

Numeric System in Shop Orders used to Simplify Cost Accounts.

This system comes directly under the "Dewey Decimal System" and has been found to be the most practical, simple, most easily understood of any system for keeping records and accounts in the factory and shops. It is a tab card system and is in almost universal use throughout this country. By its use there is no confusion of orders between any departments and the accounting office can instantly place an order in its proper file by noting the number of the order alone.

Following is the general scheme of tab card order accounting:

Order Number-

1. Engineers Time.
2. Material for engines.
3. Watchman's time.
4. Sweeping and cleaning machine department.
5. Sweeping and cleaning electrical department.
6. Sweeping and cleaning foundry.
7. Sweeping and cleaning wood working.
8. Sweeping and cleaning forge shop.
9. Oiling shafting, machine department.
10. Oiling shafting, foundry.
11. Oiling shafting, electrical.
12. Oiling shafting, wood working.
13. Oiling shafting, forge shop.

14. Unloading coal for forge.
15. Unloading coal for boilers.
16. Unloading coal, sand, pig-iron, etc., for foundry.
17. Material for placing new machines ready for operation with name of machine.
18. Labor for placing new machines ready for operation.
19. Material for making and repairing shop tools, machine department.
20. Material for making and repairing shop tools, machine department.
21. Material for making and repairing shop tools, electrical department.
22. Material for making and repairing shop tools, electrical department.
23. Material for making and repairing tools, foundry department.
24. Labor for making and repairing tools, foundry department.
25. Material for making and repairing tools, wood working department.
26. Labor for making and repairing tools, wood working department.
27. Material for making and repairing tools, blacksmith department.
28. Labor for making and repairing tools, blacksmith department.
29. Material for making repairs to ground, drain fenses, trackage, walks, etc.

30. Labor for making repairs to grounds, drain fenses, trackage, walks, etc.
31. Material for repairs and renewals of machinery, machine department.
32. Labor for repairs and renewals of machinery, machine department.
33. Material for repairs and renewals of material, electrical department.
34. Labor for repairs and renewals of machinery, electrical department.
35. Material for repairs and renewals of machinery, foundry department.
36. Labor for repairs and renewals of machinery, foundry department.
37. Material for repairs and renewals of machinery, woodworking department.
38. Labor for repairs and repairs of machinery, woodworking department.
39. Material for repairs and renewals of machinery, blacksmith department.
40. Labor for repairs and renewals of machinery, blackwmith department.
41. Material for repairing patterns.
42. Labor for repairing patterns.
43. Material for repairing flasks.
44. Labor for repairing flasks.
45. Material for repairing bloating equipment.
46. Labor for repairing floating equipment.

47. Material to put in order stores returned from contracts.
48. Labor to put on stores order returned from contracts.
49. Material for boxing stores other than contracts.
50. Labor for boxing stores other than contracts.
51. Material for repairing office furniture.
52. Labor for repairing office furniture.
53. Material for repairing jigs, templets, machine department. (Orders for new formers, jigs, templets, must come from superintendant).
54. Labor for repairing jigs, templets, machine department.
55. Material for repairing jigs, templets, electrical department.
56. Labor for repairing jigs, templets, electrical department.
57. Material for repairing jigs, templets, wood working department.
58. Labor for repairing jigs, templets, wood working department.
59. Material for repairing jigs, templets, blacksmith department.
60. Repair labor for jigs, templets, blacksmith department.
61. Unloading and handling stores.
62. Labor handling Bushnell work.
63. Material repairs to building No. 1.
64. Labor repairs to building No. 1.
65. Material repairs to building No. 2.

66. Labor repairs to building No. 2.

67. Material repairs to building No. 3.

68. Labor repairs to building No. 3.

69. Material repairs to building No. 4.

70. Labor repairs to building No. 4.

71. Material for repairing fixtures, machine department.

72. Labor for repairing fixtures, machine department.

73. Material for repairing fixtures, electrical department.

74. Labor for repairing fixtures, electrical department.

75. Material for repairing fixtures, foundry department.

76. Labor for repairing fixtures, foundry department.

77. Material for repairing fixtures, wood working department.

78. Labor for repairing fixtures, wood working department.

79. Material for repairing fixtures, blacksmith department.

80. Labor for repairing fixtures, blacksmith department.

81. Core-maker, foundry.

82. Cupola tender, foundry.

83. Labor of all kinds other than named, in foundry, such as grinding, cleaning tumblers, etc.

84. General helper in machine shop, for which no regular charge can be kept.

No order will be issued for any labor that will require less than thirty minutes in performance.

(b)

TYPES OF COST ACCOUNTING IN GENERAL USE.

Under this head the following points will be discussed:

1. The Important Ends in Cost Determination.
2. The Analization System.
3. Methods of Paying Labor.
4. Keeping a Record of Employees.
5. The Card Time Recorder.

1. The Important Ends in Cost Determination.

In cost determinatinn there are four things of prime importance:

1. Exact and Minute Labor Records.
2. A compact comparative material record.
3. Summarized and comparative labor records.
4. Departmental localization of manufacturing expense

As stated previously, all shop orders for manufactured product comes from the superintendent's office through the authority of the manager. These orders are made out in triplicate; the original is kept in the head office, under the eye of the superintendent who thus can keep in touch with the work on hand and the progress. The duplicate orders go through the assistant superintendent to the cost clerk or division foreman. The cost clerk uses one as a requisition order for material, and receipts for same, the stock keeper retains the receipted

requisition as a voucher for stock issued. The other duplicate, goes to the foreman of the various departments in which work on the order is to be done, in the form of sub-production orders, the foreman giving out work cards to employees under this order. It is seen that this is an effective and simple system of issuing orders and the checking up of orders is reduced to simple forms. A colored requisition blank should be used for supplies to distinguish this order from raw material orders. At the end of the month these orders come to the cost clerk who checked the orders and enters the charges against the different departments.

All labor records are returned by the different foreman, who are directly under the supervision of the assistant superintendent. The foreman makes reports of work done. He turns in one card for each workman including himself, each day.

If the workman is working on a day wage, the foreman enters the time the workman works on each job on a "Day Work Card" (Form AC-1001 Page 21). This side of the card is for entry of productive labor only, on the reverse side (Form AZ-33 Page 23) is shown the time the workman puts in on non-productive labor.

For entering the time of men working on piece work (Form AZ-03 Page 22) the same entry is made as for day work except pieces are reported as well as time.

A time recorder should be used to verify the foreman's reports.

The labor cards and copies of all material requisitions are in the hands of the cost clerk. He will make up two

summaries of total productive cost of each job. (Form AA-00 Page 25) gives by items the total productive labor in the job, the second (Form AY-40 Page 24) gives the details of material used.

The distribution of non-productive labor is of vital importance to the manufacturer.

The totals for various expenses as shown (Form AZ-33 Page 23) should be kept as charges and expenses of non-productive labor and are to be turned over to the superintendent by the cost clerk, and then to the hands of the manager of the factory. All charges which can be localized are charged to the department in which they originate. Cards may show that some non-productive labor was done on requisitinn by other departments, and charges for this non-productive labor must be laid to the expense of the departments in question. A record for each department expense must be kept in record form only and filed as such in the manager's office. When all charges have been totaled, a journal entry is made, charging "Total Departmental Expenses", "Manufacturing Expense General", "Shipping Expense", against the factory, and crediting "Labor and Wages Account."

The record cards show the amount of general expense, which can now be localized and charged to each department. Dividing this sum by the total productive labor charged to each department gives the Departmental Shop Expense Percentage". (Forms AN-104 Page 27).

All general factory expense which cannot be localized is charged to "Shop Expense General" and its percentage derived by dividing it by the total productive labor of the factory for the same period. Office and all other incidental expenses are totaled under the head of "All Other Expenses."

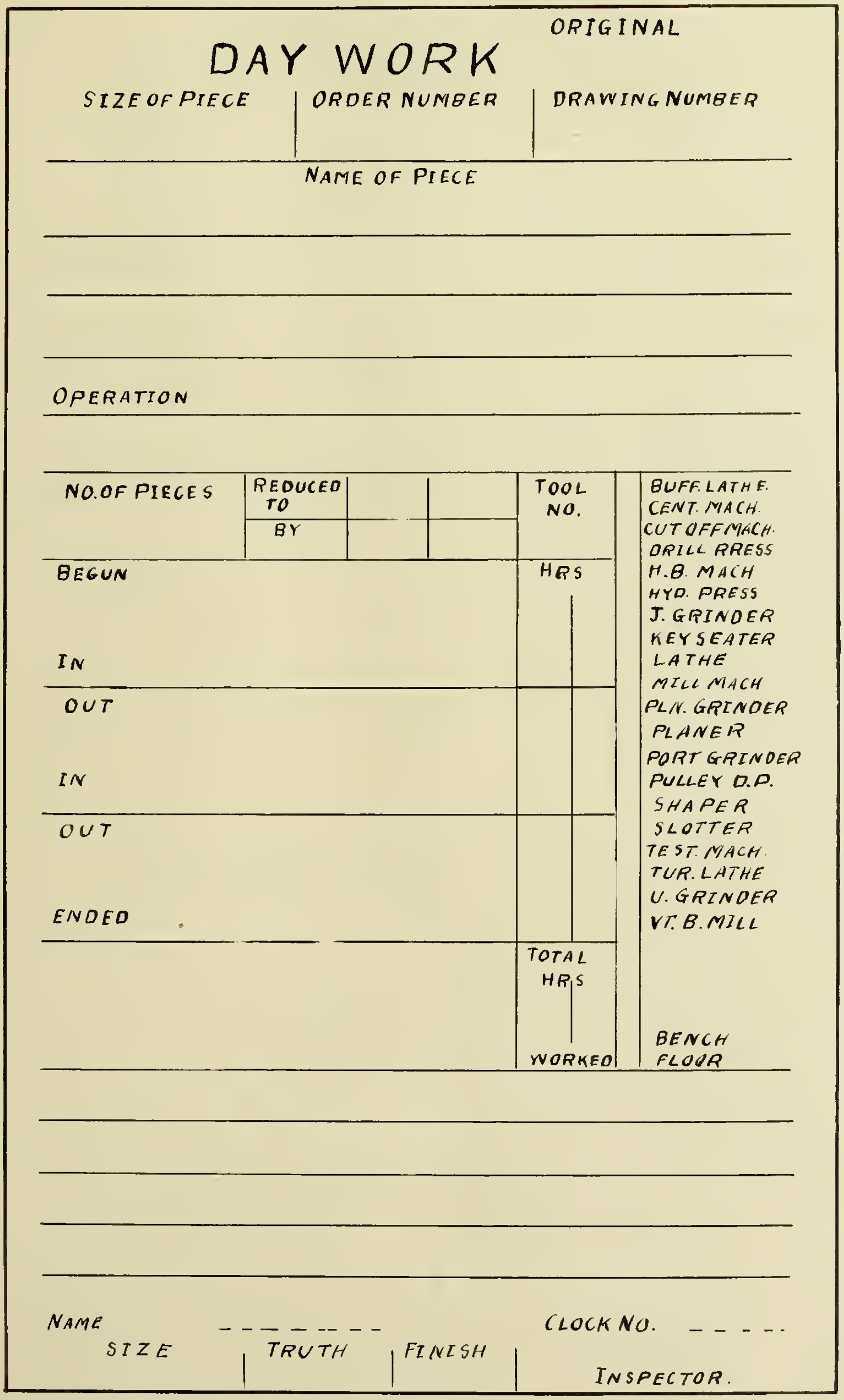
The cost clerk then fills out an "Assembly Card (Form AG-1001 Page 26) which gives the total cost of each article or job. This total cost is made up from items just described, namely, labor, material, departmental shop-expense, shop expense general, and general expense.

From this card the manager can tell the exact cost of any piece or article.

The "Work Card" records serve as totaling sheets for the daily labor and material reports, and are kept as reference on future orders.

(Form AN-104 Page 27) showing a summary giving by items the total productive labor in a job, kept posted all the time, is used as a reference basis to a great extent for the distribution of supplies, non-productive labor, and other expense.

(Form AA-00 Page 25) show how the manager may compare the output, kind, and expense of such, of any two periods of time, and make his summary reports for the same.



ORIGINAL

DAY WORK

SIZE OF PIECE	ORDER NUMBER	DRAWING NUMBER

NAME OF PIECE

OPERATION

NO. OF PIECES	REDUCED TO			TOOL NO.
	BY			

BEGUN

IN

OUT

IN

OUT

ENDED

HRS

TOTAL HRS WORKED

BUFF. LATHE
CENT. MACH.
CUT OFF MACH.
DRILL PRESS
H.B. MACH
HYD. PRESS
J. GRINDER
KEY SEATER
LATHE
MILL MACH
PLN. GRINDER
PLANER
PORT GRINDER
PULLEY D.P.
SHAPER
SLOTTER
TEST MACH.
TUR. LATHE
U. GRINDER
VT. B. MILL

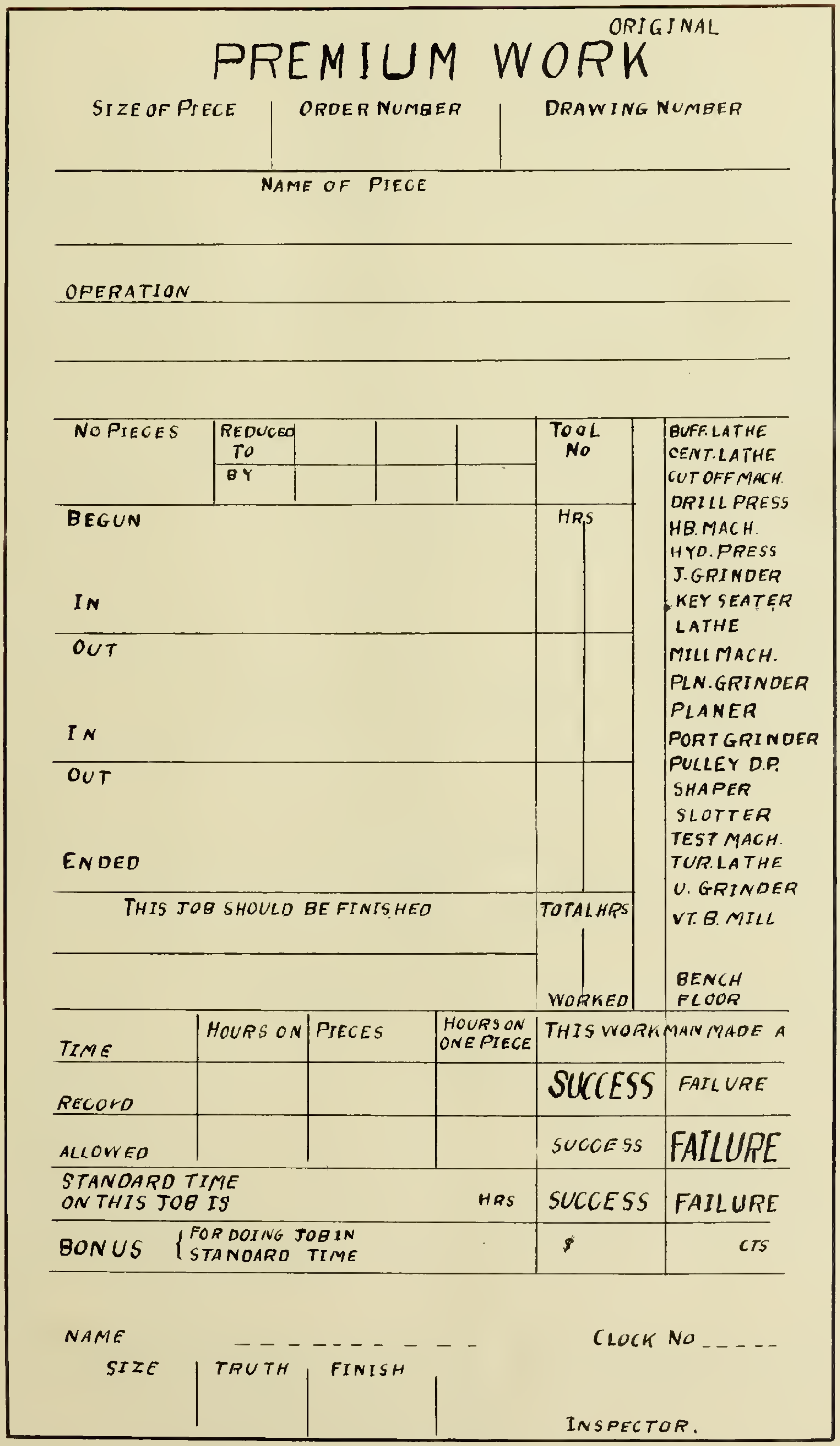
BENCH
FLOOR

NAME _ _ _ _ _ _ _ CLOCK NO. _ _ _ _

SIZE	TRUTH	FINISH	INSPECTOR.

FORM- AC-1001

CARD GRAY, 4½" x 7½". ONE DUPLICATE.



ORIGINAL

PREMIUM WORK

SIZE OF PIECE	ORDER NUMBER	DRAWING NUMBER

NAME OF PIECE

OPERATION

NO PIECES	REDUCED TO				TOOL NO		BUFF. LATHE CENT. LATHE CUT OFF MACH. DRILL PRESS H.B. MACH. HYD. PRESS J. GRINDER KEY SEATER LATHE MILL MACH. PLN. GRINDER PLANER PORT GRINDER PULLEY D.P. SHAPER SLOTTER TEST MACH. TUR. LATHE U. GRINDER VT. B. MILL BENCH FLOOR
	BY						
BEGUN IN					HRS		
OUT IN							
OUT ENDED							
THIS JOB SHOULD BE FINISHED					TOTAL HRS WORKED		

TIME	HOURS ON	PIECES	HOURS ON ONE PIECE	THIS WORKMAN MADE A	
RECORD				SUCCESS	FAILURE
ALLOWED				SUCCESS	FAILURE
STANDARD TIME ON THIS JOB IS			HRS	SUCCESS	FAILURE
BONUS { FOR DOING JOB IN STANDARD TIME				$	CTS

NAME _ _ _ _ _ _ _ _ _ _ _ CLOCK NO _ _ _ _ _

SIZE	TRUTH	FINISH

INSPECTOR.

FORM- AZ-03

CARD RED, $4\frac{1}{2}$" x $7\frac{1}{2}$". ONE DUPLICATE CARD.

SHOP WORK

ITEMIZE ALL ENTRIES

NO. HOURS	WORK	BEGAN	QUIT
	SWEEPING		
	GETTING OR SORTING CASTINGS		
	DELIVERING MATERIAL		
	REPAIRS TO FACTORY		
	GETTING LUMBER		
	HAULING CASTINGS		
	GRINDING OR SETTING DIES		
	SHIFTIN STOCK		
	MAKING OR REPAIRING DIES OR TOOLS		
	NEW MACHINERY		
	REPAIRING MACHINES		

FORM - AZ - 33

CARD GRAY, $4\frac{1}{2}''$ X $7\frac{1}{2}''$. ONE DUPLICATE.

TIME CARD FOR NON-PRODUCTIVE WORK BY DAY LABOR

COST OF MATERIAL RECORD

ARTICLE

TOTAL COST PER

1903	1904	1905	1906

GRAY IRON		MAL. IRON		CAR BOLTS		MACH. BOLTS		STEEL		SCREWS		MISCELLANEOUS	
TOTAL													
1903													
1904													
1905													
1906													

FORM - AY - 40

CARD GRAY, 5½" x 8".   COST OF MATERIAL RECORD CARD
GIVING KIND OF MATERIAL AND AMOUNT PER JOB FOR SUCCESSIVE YEARS

COMPARATIVE LABOR PLUS EXPENSE COST

ARTICLE ____________ COST BELOW PER ____________ MATERIAL PAGE ________

ORDE NO.	QUANITY	TOTAL SHOP COST	TOTAL COST	ORDER NO.	QUANITY	TOTAL SHOP COST	TOTAL COST

FORM- AA-00

CARD GRAY, 4" x 8". GIVES A DETAILED RECORD OF MATERIAL AND AMOUNT USED ON EACH JOB. COMPARATIVE LABOR AND EXPENSE COST RECORD AND TOTAL COST OF EACH JOB.

ASSEMBLY CARD

ORDER ____________ ARTICLE ____________

NO. ORDERED ____________ NO. COMPLETED ____________

	LABOR	DEPT. SHOP EXP.
OPERATION NO. 1		
" " 2		
" " 3		
" " 4		
" " 5		
" " 6		
" " 7		
" " 8		
" " 9		
" " 10		
" " 11		
" " 12		
TOTALS		
BALANCES TOTALED		
SHOP EXPENSE GEN. PERCENT		
TOTAL LABOR AND SHOP EXP.		
LABOR AND SHOP EXP. PER.		
MATERIAL, PAGE C.M. BOOK PER		
TOTAL FACTORY COST PER		
ADD FOR ALL OTHER EXP. PER		
PACKING, COST PER		
LOADING, F.O.B. FACTORY. COST PER		
TOTAL COST PER		

FORM-A6-1001

CARD PINK, 4½" X 8". ASSEMBLY CARD GIVING TOTAL COST PER JOB.

OPERATION NO.		OPERATION			ARTICLE				JOB NO.
DATE	CARD NO	WORKMAN'S NO.	NO. HOUR	LABOR COST	DATE	CARD NO	WORKMAN'S NO.	NO HOURS	LABOR COST

FORM - AN - 104

CARD GRAY, 5" x 8". ONE DUPLICATE. SUMMARY GIVING BY ITEMS THE TOTAL PRODUCTIVE LABOR IN A JOB. KEPT POSTED EACH DAY.

2. The Analization System.

The secret of the whole Analization System lies in the Labor Loading and Machine Expense.

A rate per hour must be charged on every piece of productive apparatus in the shops, both when in use and when idle. To get this rate on the number of machines used, a vast and intricate system of accounting is employed, the details of which will come later. To explain these points; every item of expense must be recorded, and reduced to a unit by divided total cost for a year by the number of productive laborers and the number of actual working hours of the machine.

With this must be added the rate of expense from Administration, Invested Capital, Insurance, Rent, Maintenance, Power, Depreciation, etc.

In determining the rate per hour to set on a machine, the cost and life of machine floor space occupied, tools necessary to run the machine auxiliary, must be considered for one year. The actual working hours of a machine is practically the most important item, for a machine that is operated only once or twice a week will have a much higher rate than one that is run continously.

The foreman of each shop is responsible for the records of the machines in his department, and suitable means of recording time of producing a piece, time used by workmen, and time of each machine used, must be accurately recorded under a simple but satisfactory system.

Take for example a large boring mill used by the Western Electric Company, used only on the largest type of motors, it was run 186 hours last year in a possible 2460 hours. The rate on this machine was $9.00. If it had been run 372 hours, the rate would have been only half as much approximately or about $5.00, the increase of fifty cents being for depreciation of the machine, etc.

The activity in productive work also effects the machine expense, for each hour wasted adds to the machine expense a small per cent.

The advantage of such a system of labor loading is evident for by it the cost to produce any article can be at once determined by the record of the machine itself.

This system is most successful when used by a manufacturing company that turns out certain standard products, as do the Western Electric Company.

The system becomes more intricate when pieces different from each other are turned out by same machines. Thus it is seen that the same rate of expense could not be added to all classes of apparatus manufactured, large, and small, because of different machines used, and different tools where the same machine is used.

Where a concern turns out certain products and uses special machines in all cases and the article is produced by the "follow-up" method, then this system becomes more simple and more readily applied.

Usually the per cent expense of production is graded

upon the machine itself and its size. Say the rate was $1.25 on motors from 1/4 to 5 H. P., then 40% would be added on motors from 5 to 20 H. P., 75% to motors from 20 to 50 H. P., on up, till the largest types of machines have charged to them a rate of 150 to 200% that of the smallest machines.

The balance of the records at the end of the year will show the expense on all classes of machines and enable the manufacturer to see the cost of the different classes of product and simply by dividing the total rate for one class by the number of pieces in this class, the cost of each is determined.

This discussion does not include Plant Location, or Department grouping, though a few works may be said from an article by Mr. O. E. Perrigo on locating departments.

"In the practical work of laying out a factory, it must be considered what the product will be, operations, input, output, and transportation facilities.

The number of departments must be decided upon, number of machines for each and machines classified according to their requirements for production, and floor space apportioned.

The "follow-up" system of production should be used throughout, the material or stock in progress should be moved in one continuous movement, for each retrograde movement adds expense and interferes with the on coming stock.

All machines must be advantageously located according to the duties required of them, lathes, cranes, hoists, tool room, stock room, etc.

The factory's growth should be provided for. Leave at least 10% of the floor space in each department to accomodate

for the growth in other departments.

The factory as a whole may be no faster than the slowest department."

3. Methods of Paying Labor.

It is thought necessary to discuss the different methods of paying labor, and this article is taken principally from a paper by C. E. Woods, C. E., M. E., with illustrations as indexed and forms.

It is very essential that the manufacturer be familiar with the advantages and disadvantages of paying labor and strive to combine the various methods to suit the most satisfactorily his factory.

Day labor is the common form of labor and is the oldest known, and is the loosest in method for its economy or loss to the employer depends to a great extent on the honesty of the workman and his skill. Cases are common where a dishonest workman will avoid doing labor assigned him and be idle for several hours each day, since there is hardly a way to correct this evil, even though overseers and the assistant superintendant are supervisors of the work in the factory. Several methods have been devised to correct this evil.

A day work time card is shown (Form Page 21) showing the time on productive labor and unproductive labor and work done.

The piece-rate system has been devised as a means of increasing production, and since the number of pieces turned out in a day are a direct record of the skill and speed of a workman, this system is in general use. This system establishes a fixed price on the labor cost of work and forms a means of making correct estimates on all work done. The bad point of this system is that eventually the workman will neglect care

for speed and the rate for labor employed becomes excessively high, from which follows a rate cutting and consequent dissatisfaction of the workman. At this point the employee ceases to exert himself to turn out a greater number of pieces, thus getting out of machines and labor less than they are capable of and defeating to an extent the purpose of the piece rate system. Mr. Halsey on piece work says: "No man knows what he can do under incentive until he has tried it. Under test the increase of out put is remarkable. The output mounts up and wages with it until the manager realizes that he is paying in excess of what should be paid a workman for the work done. The employer cuts the piece price. The workman finds that if he pushes his work beyond a certain limit his wages are cut so he stays within the limit." In piece work the wage price is constant unless rate cutting is resorted to, and the workman receives the benefit from increased output. Piece-work card form is shown in (Form Page 22).

The premium plan is perhaps the most advisable of any plan yet adopted to increase production. The employer must realize that though he pays a premium for extra work done, yet that premium is in all cases less than the saving on the cost rate of machines and material used.

The premium plan is in fact an agreement between employer and employee that a certain time, fixed by reference to past work done under favorable conditions, be allowed to finish a piece of work, and if the employee does the piece in less than the given time he is paid a percentage, fixed on by the employer, for the difference in time allowed and time

actually used. The one objection to this is that the employee is thus sure of a regular day work rate and may not exort himself for premiums, though in general practice it has been found that the employee will strive for premiums. For example, say an employee received 30 cents per hour, and his premium is 10 cents per hour, then if he lays one hour of time on a certain piece of work he has gained 10 cents over his regular pay and has saved 20 cents to his employer, besides the gain to the employer in increased production of his plant and lower cost rate on his machines in the factory while the expense items for burden are increased only very slightly.

When the employee takes more than the alotted time on a piece then his wages are decreased just to the amount he would lose if he were working by day rate.

The premium system according to the best economists in manufacturing is permanent in its effect and has solved a great problem in economical production in the factory. It is used generally now in most plants.

To quote Mr. Wood on Differential Piece Rate System: "This is a system in which the piece price starts off at a comparatively low figure. That is to say, for a given amount of work per day the wage earned on piece-work would be much less than if the laborer were working by the day or hour for the same amount of work--the purpose of which is two fold: First, to stimulate activity toward increased effort on the part of the employee, and second, to attach a penalty for too great an effort on his part if the workmanship is inferior.

The method is to set a price for the amount of work that is to be done in a specified time, exceeding which the price per piece is raised not only for the work done in excess of the limit set, but for the entire contract or number of pieces both under and over the limit. The result claimed for this by those who have tried the system is less immediately incentive on the part of labor to establish speed than in the direct system, while the penalty, if the workmanship is inferior but passable, is greater--as in this case the piece price is not raised though the amount of work done per day has exceeded the limit set. Good workmanship however, results in high average pay to the labor, but without any reduction in piece price or wage cost per piece, the aim being the attainment of an extremely low equipment cost per piece by causing the labor to raise a large output in production.

The weakness, if any, in this system, lies in the fact that absolute prior certainty must be known regarding the cost of production relative to labor and also ultimate machine capacity, as a mistake in this would result in the complete failure of the system; in one case discouraging the worker by having set an unattainable limit, and on the other hand, by the setting of a too easily attained speed of production, necessitating rate cutting, or what amounts to the same thing, increasing the amount of work done in the same limit of time."

It will be hardly necessary to discuss relations between employer and employee as to ethical relations, as the case of each manufacturer will be governed largely by the local labor political environment of the factory itself.

Labor itself is governed in great measure by the unions, a non-union laborer being employed only in special work; the trades and general work being filled generally by union men. The one weakness of the labor unions is that inexperienced workmen and boys may receive the same pay as experienced workmen, if the pay is by the day work system, though this difficulty may be eliminated where the pay system is by the piece rate.

4. Keeping a Record of Employees.

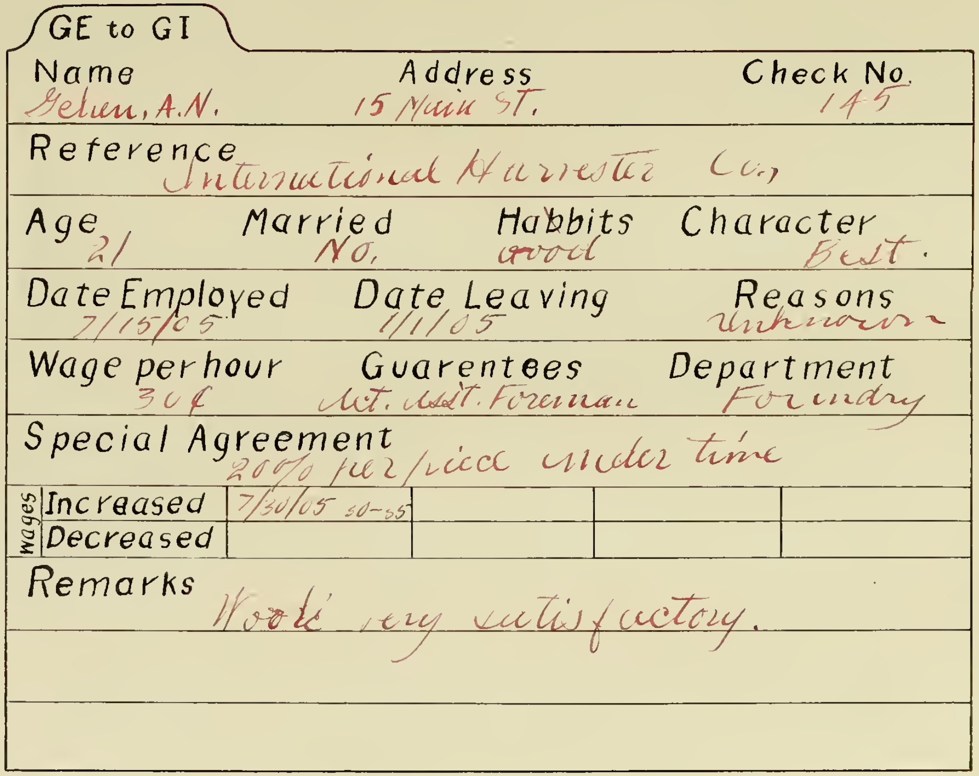
It is very important that a firm should keep a record of employees. Such a system is economy to the manufacturer and insures fair treatment to the employees.

A very simple system is used by the Metropolitan Traction Company of New York and can be adopted by any manufacturing company.

Cards are filed alphabetically in two alphabetical indexes, one set for the active employes and one for applicants and ex-employees. To change the relations of the occupants of either box requires only a few words entered on blank spaces on the cards then they may be deposited in the file to which they belong. (Form 7 A. Page 36) shows the card to be used.

The card shows the name, address, age, habits, reference, and other necessary data concerning the applicant or employee.

By the use of this system a close watch can be kept on the employees, and merit or deficiency can be timely awarded.



GE to GI

Name Gehen, A.N.
Address 15 Main St.
Check No. 145

Reference International Harvester Co.

Age 21
Married No.
Habbits good
Character Best.

Date Employed 7/15/05
Date Leaving 1/1/05
Reasons Unknown

Wage per hour 30¢
Guarentees Act. Asst. Foreman
Department Foundry

Special Agreement 20% per piece under time

Wages	Increased	7/30/05 30-35			
	Decreased				

Remarks Work very satisfactory.

Form 1.A. Card white.

5. The Card Time Recorder.

The card time recorder is a very valuable asset to the cost accounting system. The actual time in hours and minutes is registered on the workman's work card (Form AC-1001) by registering the time of commencing a job and time at which it is finished. These cards are to be taken care of by the Assistant Superintendent.

The foreman lays out the work for the men under him and gives him a work card bearing the order number, number of the employee, and the number of the piece or article to be worked on. The time work is commenced on this particular job is punched on the recording machine and also time it is finished, if interruption occurs, such time should be recorded if it exceeds thirty minutes.

By this arrangement the superintendent is able to determine the fitness of the foreman in a department, and his ability to get proper returns from those under him. Failure to provide work in advance resulting in idle workmen and idle machines is immediately apparent and the proper remedy is applied.

The total time recorded on work cards of each employee for the day must agree with his pay roll card. Any difference is recognized at a glance and can be quickly balanced. (See Form AZ-03)

All production orders must be issued by the manager, written by the cost keeper and issued in duplicate (See Forms 820-H Page 47). The original remains in the cost room, the duplicate being sent to the stock room, where the Assistant

Superintendent issues the work cards and work order to the foreman in the department in which the order is to be filled.

Exceptions are orders issued upon requisitinn of the foreman and O. K.'d by the superintendent, for repairs, stock, etc.

A sub-production order, is an order issued by the cost keeper for work to be done on the original order, and agrees in number of order and pieces to the original, and is issued to the foreman of the department in which the work is to be done.

As soon as the production order is issued the cost keeper or clerk fills out a card, one for each part called for on the production order and enters upon each of the cost index cards the date, number, and description of the production order; he also fills out an index card corresponding to number of production order and places it in a work card file.

(c)

MECHANICAL AIDS IN COST ACCOUNTING.

Under this title will be described some of the various aids to cost accounting in the factory by the use of time clocks, and calculating machines which are used to facilitate the problem of factory expense. For a further discussion on this subject reference should be made to "The Complete Cost Keeper" by Arnold, and to the various concerns manufacturing time clocks, workman's detectors, etc.

The time clock has taken a place of preemminence for exact recording of time employment of laborers in the factory, and is a necessity in any shop where a number of workmen are employed and where the question of time on finishing product is vital.

The time clock checking of laborers is in distinct contrast with the ordinary old system of using brass checks with respective number of a workman on it. The old method of using brass checks for the workmen calls for careful and continual surveilance by the foremen of the shops and the assistant superintendent or time clerk; then too a dishonest laborer may missuse his check or fail to register it and there is no positive way of keeping exact tab on his time. With the time clock it is different, each workman has a certain key which he uses to register the time of entering and time of leaving the shop, or he pushes a certain button corresponding to the number he is employed under.

With the time clock, there is no possibility of error in the time records and the time clerk is assured that the records are accurate and final as to time employed by the different workmen.

Also this strict rule of registering the exact time put in on a single job protects the employer against any inclination of the employee to loaf or appear late for work. The employee knows he will be docked an hour if he registers even fifteen minutes late and this is usually a sufficient incentive to be on duty on time. In some factories the doors are closed a c ertain time and are not opened for a half hour, thus if a man is late he loses a half hour, but this plan is unsatisfactory in that the employer loses as much as the employee and so time clocks should be used whereever possible.

The workmen know the rules which govern the factory in which they are employed and govern themselves accordingly; it will be found that the workmen will not be prejudiced by the use of time recorders, in fact those shops using them are generally filled with the better class of laborers.

"Good factory management may be said to consist of clearly defined lines of conduct, as between employers and employed, so rigidly enforced as to admit of no variation whatever." The "Chicago Time Recorder" says in regard to loss of time by employees, and consequent loss to employer: "A loss of only five minutes for employees receiving a salary of $2.00 per day amounts as follows:

Employees	One Year
25	$ 130.00

Employees (Cont)	One Year (cont)
50	$ 260.00
100	520.00
500	2600.00

This represents, to the management, in wages only, from a daily time loss of only five minutes for each of the number of workmen specified." "Punctuality involves no hardship for the workman."

Under calculating machines are used the straight and circular slide rule, manufactured by many companies, and key-operated machines for adding, subtracting, etc. Care must be taken though to not operate any automatic recording machines beyond its speed limit and thus involve large possible errors. The aim of every establishment is to follow an efficient system of working throughout and so all time clocks must be timed the same, run by electricity if convenient.

One author says there is no difference between books and cards as regards error in clerical records, yet the favor must be for the cards as they are more easily indexed and easire of access, and may be checked with greater dispatch, card forms of indexing work records are surely the advance of the old method of counting books and ledgers the same as the modern computing machines are the successors of the old methods of long hand computation.

The first invention of a computing machine is one by Plaise Pascal, France, about A. D. 1642-5, then came Edward Scheuty of Stockholm with a computing or error correcting

machine in 1855, and so on up to the present time, the "Felt and Turant Computing Machines" being probably the best known.

Under Time-Recorders may be mentioned "The Rochester Card Recorder", "The Bundy Time Recorder," and "The Chicago Time Recorders," and the "Employer's Time Recorder, Morse System."

All these recording time machines are fitted with the best time-works made and are either run by electricity or require winding only once per week, and all the mechanism is automatic and made from the best quality of materials.

The feature of the Rochester Recorder is that it employes a card system, each card lasting for a week and is kept in a card case at the side of the machine. Upon his arrival the employee takes out his own card, drops it in a slot and pushes a button till a bell rings then he places the card in the "in" rack the time of arrival being stamped in the properplace. This recorder is simple and efficient. It is manufactured by the International Time Recording Company, of New Yokr.

With the Bundy System, the employee upon arrival takes a key from the "out" rack inserts the key in his own numbered slot and gives the key one turn, thus registering upon a ribbon the time of arrival, then he places his key in the "in" rack. Each registration rings a bell so any attempt to register for another employee would be detected. This apparatus is also manufactured by the International Time Recording Company, of New Yokr.

The Chicago Time Register Company of Chicago, manufacture both a numerical (or key) and an autograph recorder. The distinctive feature of their machines is the sight opening which permits the workman to inspect his own registry of time and thus allows for no disputes as to time of arrival or leaving, between himself and employer.

The autograph recorder requires the employee to sign a card on the machine; his arm resting on a lever support so that at the moment of registering his name and raising his arm from the support registers his time on the card. This machine is very rapid in its use.

The Morse system of recording is by a clock and dial, upon which are numbered knobs; the employee turns his knob half around and thus registers his time in a record sheet. Several employees may register at the same time, and a glance at the dial will tell exactly who is in or out.

III.

SYSTEMS AND FIELDS COVERED BY COST KEEPING SYSTEMS ENTERED IN THIS DISCUSSION.

The four establishments who were kind enough to furnish cost forms and order blanks are: The Western Electric Company of Chicago, Illinois; A. L. Ide and Company, manufacturers of the Ide engine, Springfield, Illinois; Root and Vandervort, East Moline, Illinois; and the International Harvester Company, Chicago, Illinois.

Forms furnished by these companies will be taken up in the order named and described.

The Western Electric Company designed its own cost keeping system and have a simple, efficient means of cost determination.

Two work cards are used, shown on page 47 Form 328GN(RK) The first is the straight piece work credit and time card or ticket. This card is given each workman for each job and the time of starting and ending is checked both by himself and the foreman of the shop. As seen by inspection of the card, every item and time of work is accounted for and time checked, and work inspected and passed upon. This card is good for a job taking any limit of time to finish from 30 minutes up. The cards are made in duplicate so that checking of totals is very simple. The time of machines, and name of machine used, are recorded and thus may the rate on the machine be determined.

The straight day work time card or ticket, page 47 Form 325GN(RK22) differs from the P. W. ticket only in that a flat day rate is paid the workman and no credit or premium is accounted for.

The foreman's Orcer blank shown on page Form No. 620M, is very simple and inspection renders description unnecessary; the orders that the foreman receives from the assistant superintendent or stores clerk are all checked and recorded on the foreman's order and then work tickets are given to the workmen for this order in his department. There are blanks for as many operations as may be needed on each job, and numbers of sub-orders are recorded on this order, also all material delivered.

This order when completed is handed into the time clerk with the workman's time tickets.

The cost estimate card or assembly card is shown on page 47, Form 147GN(CA). This form is made out in the superintendent's office and passes to the manager's office where it is given to the head office authorities as required.

As seen by inspection each separate item of expense per article or job, including labor, labor loading, machine cost, packing, transportation, engineering expense per cent, all other expense, including per cent profit charge, is recorded, and number of pieces made and delivered, are recorded. This card must be approved by the factory manager and the cost clerk in the head office.

The cost summary card is shown on page 47 , Form 377 GN(CA3).

This card is a summary of total cost on the different parts on each job, and the departments are named and total cost of labor and labor loading in each department is recorded and summarized. The time clerk makes out these forms which then are checked by the superintendent and manager and duplicate sent to the head sales office.

Classification cards are shown on pages 46 and 47 These cards were filled out from an order for a 200 K. W. Alternator and the analysis may be seen from the cards.

The Western Electric Company know the cost of each machine or article they build and sell accordingly.

This company has found that the two systems of paying labor, piece rates system, and straight day work system, must be used together, having the piece rate and premium rate as an advancement for the workman as his proficiency and value to the company increases.

On small machines this company is outbid by other companies selling the same class of machines, so competition is met by charging a higher price on their large machines, thus covering the loss sustained on the smaller machines.

R-31-CE-200 K.W.

Stator less winding for 200 K.W. Alternator

CLASSIFICATION 24/200/E

CLASS R-31 CE NUMBER 200 K.W. STYLE Engine Type ANALYSIS NO. 1

ORDER NO. 76708 STARTED 5/23/06 FIN. 2/26/07 NO. MADE 1 COST EA. 750,00

COST PER One DRAWING G-53111 H 54906 DATE 9-3-06 9-3-06

FOREMAN	DEPARTMENT	D.W. P.W.	LABOR	MACHINE EXPENSE	MATERIAL	MATERIAL EXPENSE	TOTAL
Wiltshire	Cast		8676	16036			
Lawson	Anneal & Japan	✓	292	292			
Bartz	Machine		958	459			
"	& assem.	✓	3390	5043			
Raleigh	Punch Segments		61	91			
"	Assem. Ventilator	✓	3176	7764			
Fraser	Machine		206	87			
"	Make Studs	✓	210	301			
1 Patt. 53111-a Cast Iron 2620# 2 " 54998-a " " 790# 28 " 53165-a " " 504#	3914# @ .01264#				4947		(FRAME) (END PLATES) (SHIELDS)
3/4" Rd. C.R. Steel for studs 32#	" .0275#				89		
#26 U.S.G. Sheet Steel 3680#	@ 2.765 cwt.		scrap 1736#		9064		scrap @ .0064#
#18 " " 125#	2.615 "				326		
#24 " " 40#	2.565 "				1 02		
Misc. Screws, Nuts etc.					24		
			16969	30073	14652	4396	66090
30 hr. Annealing Segments	944#		351	2670			3021
			17320	32743	14652	4396	69111
Engineer Loading 8½%							5874
							74985

FOR

FILE NO. ANALYZED BY E.P. Kealy DATE 3/30/07 CHECKED BY DATE

FORM 13-A

STATOR CORE

CLASS R31-CE. NO. 200 K.W.

CLASSIFICATION

Ana'ys No.	ORDER NO.	Date Finished	NUMBER MADE	Cost of Labor Per One	MACHINE EXPENSE	MATERIAL	MATERIAL EXPENSE	STORE ITEMS E.L.	TOTAL COST Per One
1	71670 S	2/16,07		17320	32743	14652	4396	5874	74985

WEST-WILLIAMS CO. 5738

FORM 377 G N (CA 3)

COST SUMMARY

REQ. No.

FILE No.

S. O. No.

DATE

FOR

DESCRIPTION

DEPARTMENTS
1
2
3
4
5
6
7
8
9

DEPARTMENTS	LABOR		LAB. LOAD.		MATERIAL		MAT'L LOAD.		TOTAL	
1										
2										
3										
4										
5										
6										
7										
8										
9										

DELIVERIES

DEBIT

CREDIT	AMOUNT	
36-LABOR		
" LAB. LOAD.		
" MATERIAL		
" MAT'L LOAD.		
37		
TOTAL		
TOTAL		

TRANSFERS

DR.	AMOUNT		CR.
32			
"			
"			
"			
"			
"			
"			
"			
38			32

FORM 147 GN (CA)

COST ESTIMATE
(POWER APPARATUS)

ESTIMATE NO. ____________

DATE ____________ 190__

ESTIMATE REQUESTED BY MR. ____________ ON ____________ 190__

TYPE ____________

____________ K. W. DYNAMO ____________ R. P. M. FOR ____________

____________ H. P. MOTOR ____________ R. P. M. ____________

VOLTS ____________ AMP. ____________

____________ ____________ D. ____________ ____________ WOUND ____________

PART	NOTES	LABOR	L. ON L.	MATERIAL	L. ON M.	TOTAL
FRAME						
POLE PIECES						
SUB BASE OR SLIDING BASE						
RAILS AND SCREWS						
P. E. BEARING						
C. E. BEARING						
DOORS						
COVERS						
FIELD COILS						
FIELD SPOOLS						
FIELD COIL RETAINER						
FIELD CONNECTIONS						
CONN. BOARDS						
ROCKER						
"						
BRUSH ROCKER ADJ.						
BRUSH HOLDERS						
" "						
BRUSHES						
"						
B. H. ARMS						
COLLECTOR						
SHAFT						
ARM. CORE						
ARM. WINDING						
COMMUTATOR						
PULLEY						
COUPLING						
ASSEMBLE, TEST						
PAINT						

TOTAL SHOP DELIVERIES - - - - - -

ENGINEERING LOADING % - - - - - - - -

TOTAL STANDARD COST F. O. B. FACTORY - - -

ADD (OR DEDUCT) CURRENT VARIATIONS - - - - - -

TOTAL ESTIMATE OF ACTUAL PRESENT COST - - - - -

CORRECT ____________ SHOP COST DEPT.

COST AS ABOVE PER ____________ - - - - - - -

COST OF PACKING MATERIAL AND PACKING - - - - - - -

WEIGHT AS ABOVE - ____________ LBS.

WEIGHT OF PACKING MATERIAL ____________ LBS.

TOTAL WEIGHT ____________ LBS.

CARTAGE AT ____________ CWT - - - - -

FREIGHT ____________ TO ____________ AT ____________ CWT.

TOTAL COST F. O. B. DESTINATION - - - - -

ADD % STORE EXPENSE - - - -

% PROFIT - - - -

SELLING PRICE PER ____________ - - - -

APPROVED,

____

SALES DEPARTMENT.

FORM No. 620 C

FOREMAN'S ORDER

SUBJECT No.

DATE PROMISED

DATE FINISHED

REQ. No.

DEPT. No.

FOR

DESCRIPTION

FOR ADDITIONAL INFORMATION SEE ORDER CARD No.__________

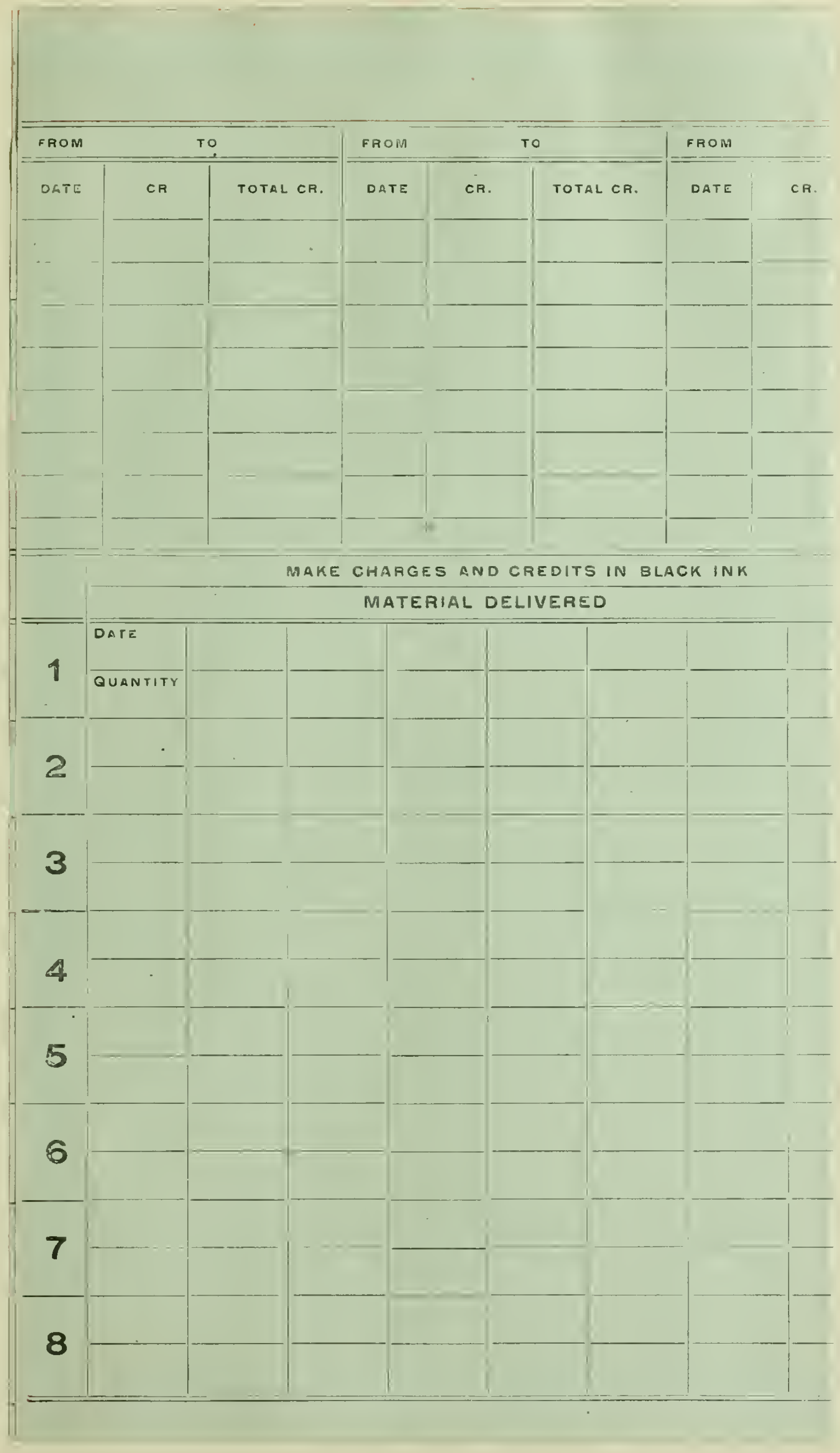
S. O. No.

FILE No.

DATE

TICKETS ISSUED TO

	OPERATION AND PART	DETAIL, GROUP OR PATTERN NO.	DRAWING NO.	Deliver To	DRAW FROM	NO. OF PCS.	QUANTITY	DESCRIPTION
1								
2								
3								
4								
5								
6								
7								
8								

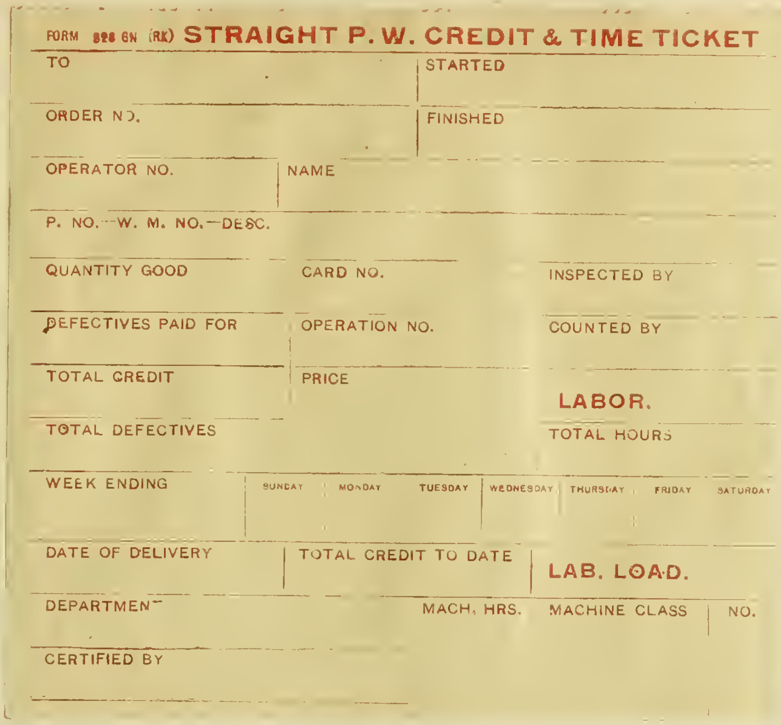


FROM		TO	FROM		TO	FROM	
DATE	CR	TOTAL CR.	DATE	CR.	TOTAL CR.	DATE	CR.

MAKE CHARGES AND CREDITS IN BLACK INK

MATERIAL DELIVERED

1	DATE							
	QUANTITY							
2								
3								
4								
5								
6								
7								
8								



FORM 326 GN (RK) **STRAIGHT P. W. CREDIT & TIME TICKET**

TO

STARTED

ORDER NO.

FINISHED

OPERATOR NO.

NAME

P. NO.—W. M. NO.—DESC.

QUANTITY GOOD

CARD NO.

INSPECTED BY

DEFECTIVES PAID FOR

OPERATION NO.

COUNTED BY

TOTAL CREDIT

PRICE

LABOR.

TOTAL DEFECTIVES

TOTAL HOURS

WEEK ENDING	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY

DATE OF DELIVERY

TOTAL CREDIT TO DATE

LAB. LOAD.

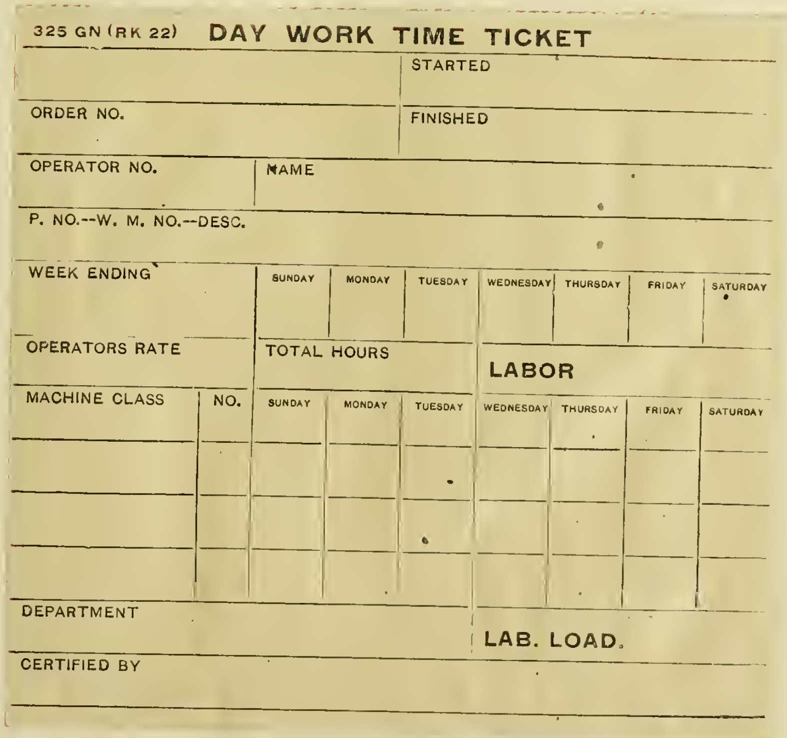
DEPARTMENT

MACH. HRS.

MACHINE CLASS

NO.

CERTIFIED BY



325 GN (RK 22) **DAY WORK TIME TICKET**

STARTED

ORDER NO.

FINISHED

OPERATOR NO.

NAME

P. NO.--W. M. NO.--DESC.

WEEK ENDING	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY

OPERATORS RATE

TOTAL HOURS

LABOR

MACHINE CLASS	NO.	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY

DEPARTMENT

LAB. LOAD.

CERTIFIED BY

The A. L. Ide and Company cost keeping system is a very good system, and its factory cost accounting forms will now be described.

The ordinary messenger call card is shown on page These cards are placed in all the departments and when a messenger is sent on an errand these cards are filled out and sent to the cost clerk.

On page 50 are shown cards for pattern records, they are made in duplicate form as shown; the yellow envelope being kept with the blue card within by the cost clerk. The assistant superintendent issues these orders to the foreman of the pattern shop for making up or the order may be filled from the pattern store-room.

On page 50 is shown a card for record of castings made for each job. These cards are filled out by the assistant superintendent, delivered to the foreman of the forge, or foundry to be filled and after being checked are sent to the cost clerk.

The card for Lost Time shown on page 50 is a non-productive time card. All non-productive labor by the workmen are entered on this form of card, passing through the foreman to the time clerk.

Only laborers working on day work are required to do non-productive labor such as sweeping, moving and setting up machines to be used in the factory.

Each item of such non-productive labor is written out and the exact time of beginning and finishing such work is recorded on this time card.

This form of card is very essential as it renders the problem of determining labor and machine rates more easy of solution.

On page 50 are shown premium coupons, made in duplicate, one kept by the workman, the other sent to the time clerk.

The premium work card is shown on page 50 . This card is made in duplicate, is filled out by the foreman of the department in which this particular job is in progress, from the time cards of the workman. The original card is kept by the time clerk.

Notice is called to the items on this card, showing just what time is taken on a particular job, and the quality of work done with reference given to previous like work. This card is recommended as the best form of any yet designed.

The day work card, shown on page 50 differs from the premium work card in that a flat rate is paid the workman and it is assumed the class of his work will be standard, and only the time of finishing job, and time on various machines need be recorded.

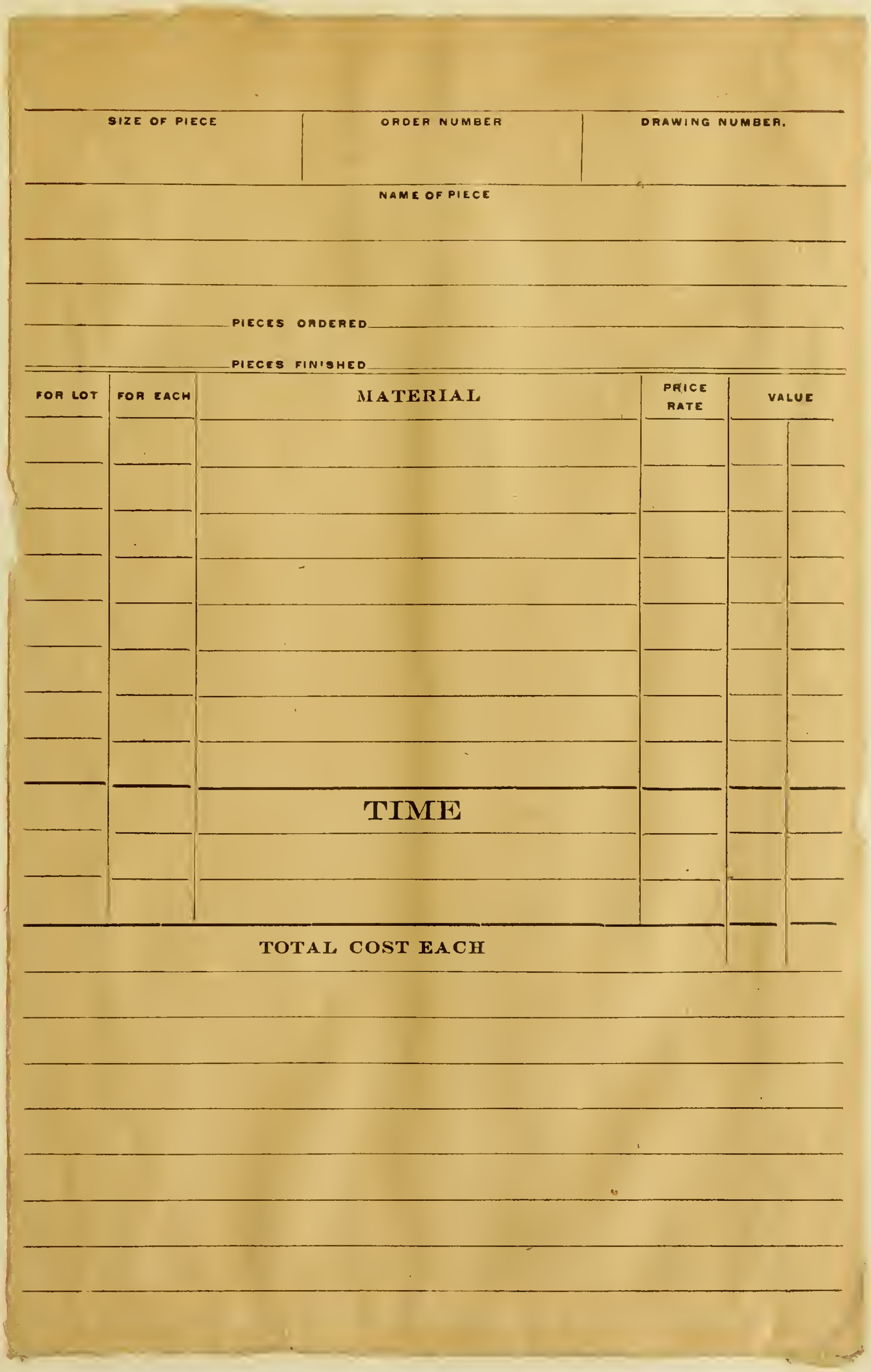
These cards are kept by the time clerk and duplicate sent to the cost clerk.

The card in duplicate shown on page 50 is a summary cost card for different pieces on a job filled out by the foreman of the department in which placed by the assistant superintendent, and placed with the cost clerk at completion of job. The duplicate being kept by the stores clerk.

The form shown on page 50 is a record, describing the piece or total pieces on a job and giving the various items of expense and totals. This form is filled out by the cost clerk and given to the manager of the factory.

Each department usually has one or more inspectors who act under the assistant superintendent, if the size of the factory warrants the employment of such men, the inspectors keep rrack of all work in progress, and work completed, fill out report as shown by form on page 50 , and hand same into the cost clerk.

On page 50 is shown one side of envelopes used in the cost clerk's office. This envelope contains duplicates of all work cards, material cards, sub-order cards, etc., used on each job, and this filled envelope is kept by the cost clerk. On the front of this envelope is the number of the production order as issued by the manager, description of the job, total cost, and such remarks as are deemed necessary for reference and indentifications.



SIZE OF PIECE	ORDER NUMBER	DRAWING NUMBER.

NAME OF PIECE

PIECES ORDERED

PIECES FINISHED

FOR LOT	FOR EACH	MATERIAL	PRICE RATE	VALUE
		TIME		

TOTAL COST EACH

INSPECTOR'S SPECIAL REPORT

Size of Piece	Order Number	Drawing Number

Name of Piece

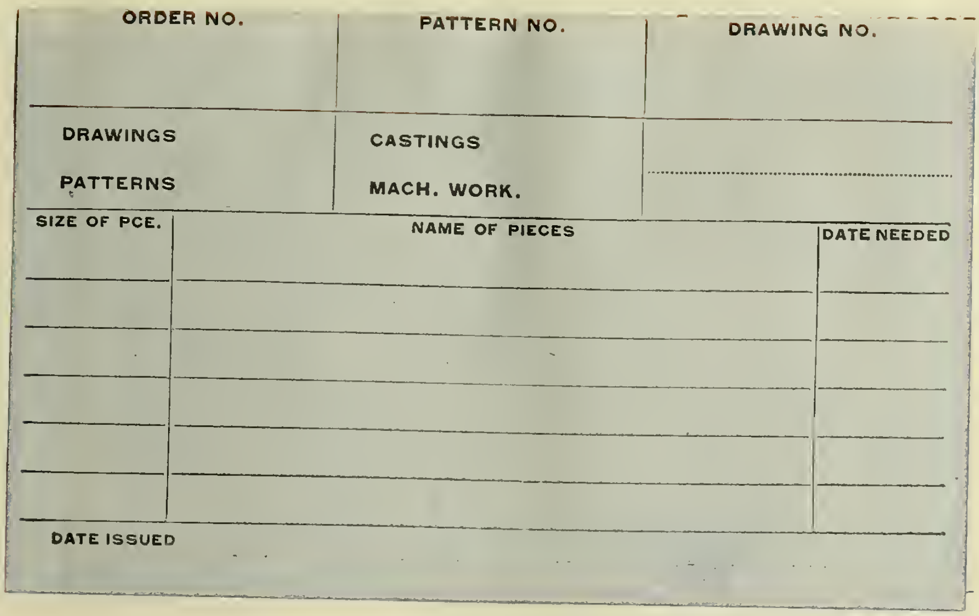
MEMORANDA

Date ______________________ **Inspector**

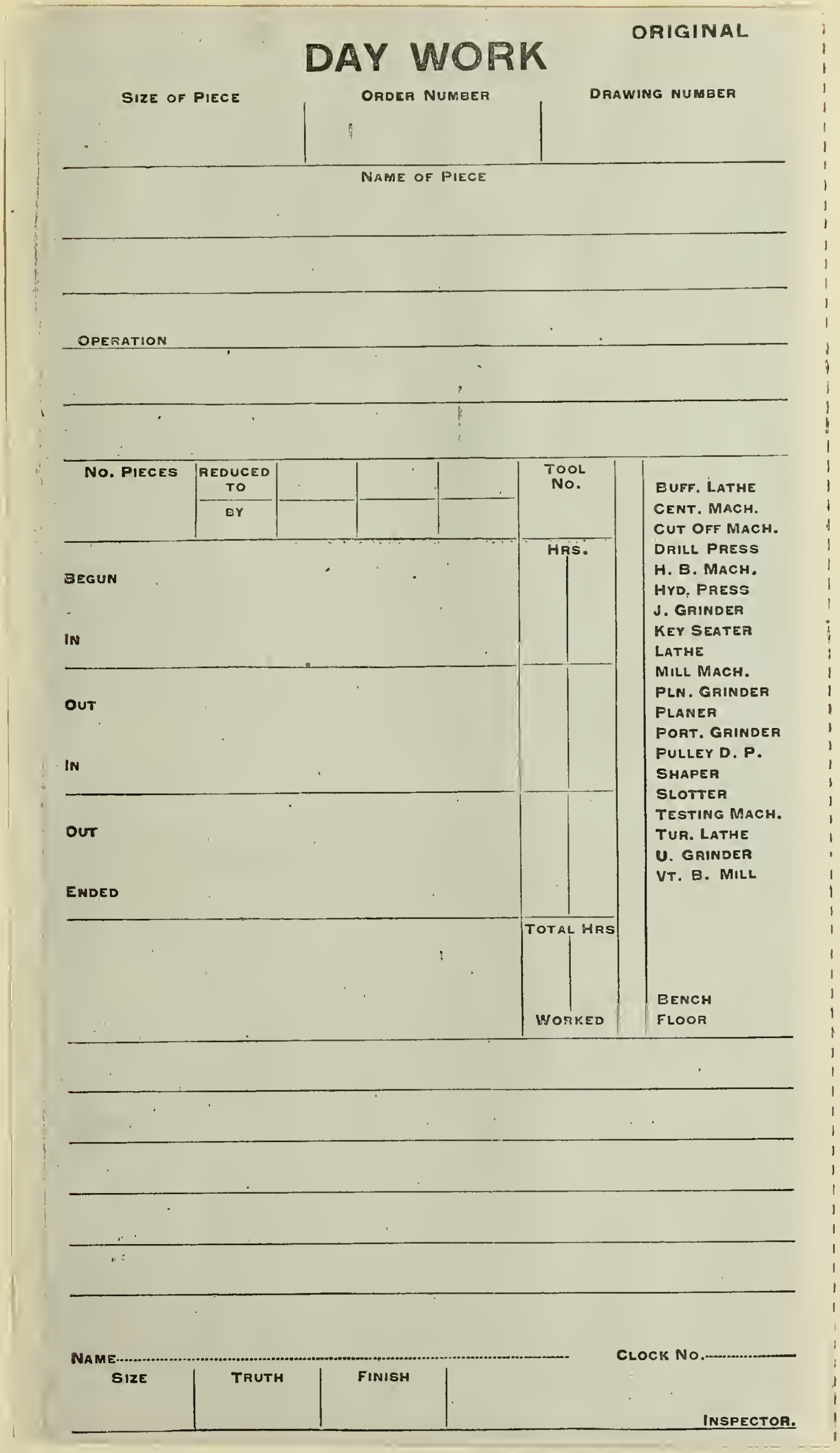
Examined by Foreman	
Special Correction Ticket	
Sizes transferred to applied parts	
Entered on engine record sheet	
File with work ticket to await application	
Ready for final filing for record	

f Lbs.	Price Rate.	Material Value.	Labor.		Total Value.
			Hours.	Value.	

	NAME AND DESCRIPTION.	Size.	Ticket No.	Plate No.	No. of Pcs.		No. of Lbs.	Price Rate.	Material Value.	Labor. Hours.	Labor. Value.	Total Value.



ORDER NO.	PATTERN NO.	DRAWING NO.
DRAWINGS PATTERNS	CASTINGS MACH. WORK.	
SIZE OF PCE.	NAME OF PIECES	DATE NEEDED
DATE ISSUED		



ORIGINAL

DAY WORK

SIZE OF PIECE	ORDER NUMBER	DRAWING NUMBER

NAME OF PIECE

OPERATION

NO. PIECES	REDUCED TO BY				TOOL No.

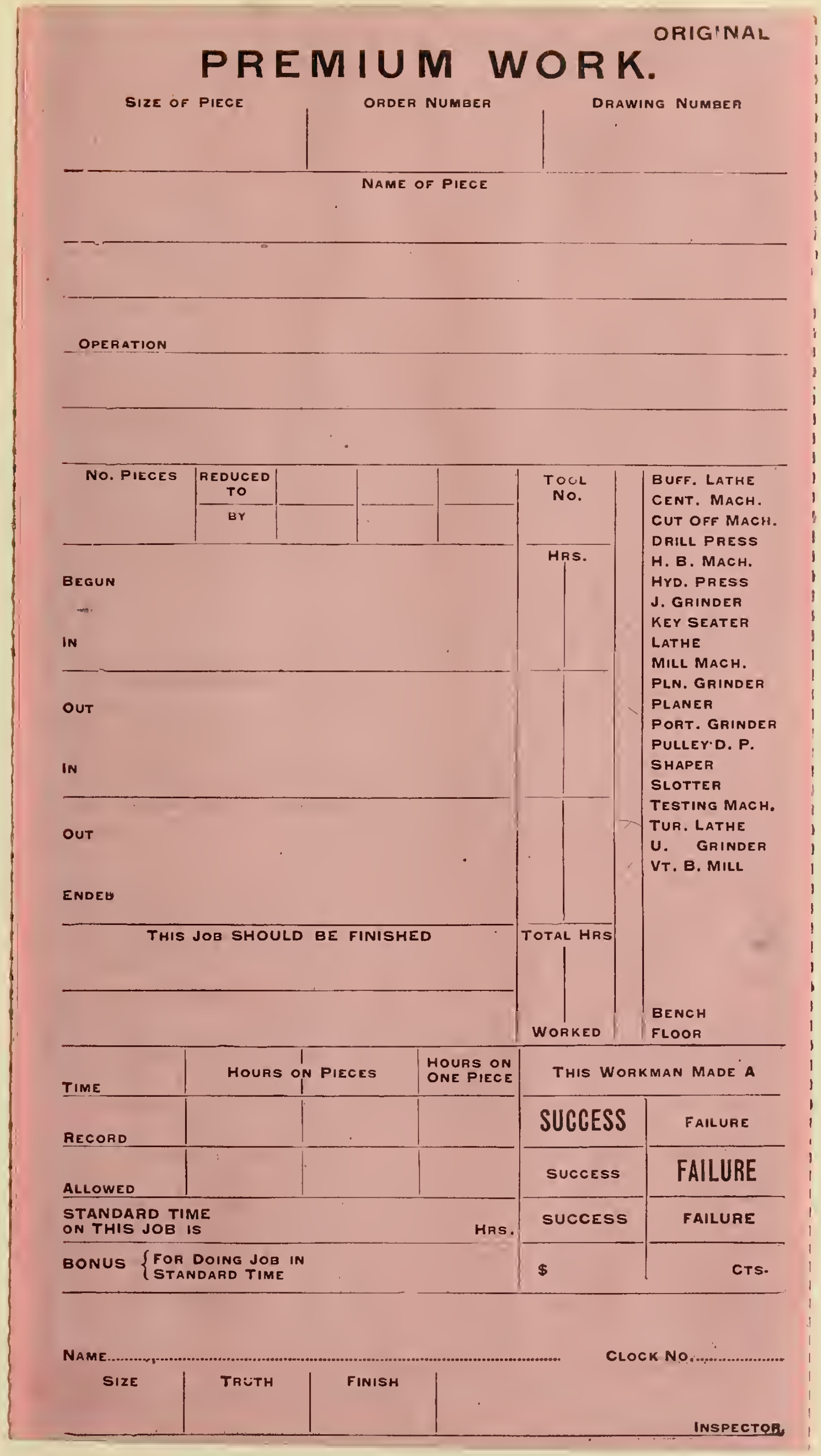
	HRS.
BEGUN IN	
OUT IN	
OUT ENDED	
	TOTAL HRS WORKED

- BUFF. LATHE
- CENT. MACH.
- CUT OFF MACH.
- DRILL PRESS
- H. B. MACH.
- HYD. PRESS
- J. GRINDER
- KEY SEATER
- LATHE
- MILL MACH.
- PLN. GRINDER
- PLANER
- PORT. GRINDER
- PULLEY D. P.
- SHAPER
- SLOTTER
- TESTING MACH.
- TUR. LATHE
- U. GRINDER
- VT. B. MILL

BENCH
FLOOR

NAME.. CLOCK NO.................

SIZE	TRUTH	FINISH	INSPECTOR.



ORIGINAL

PREMIUM WORK.

Size of Piece	Order Number	Drawing Number

Name of Piece

Operation

No. Pieces	Reduced to by				Tool No.
					Hrs.

Begun

In

Out

In

Out

Ended

This Job should be finished

Total Hrs

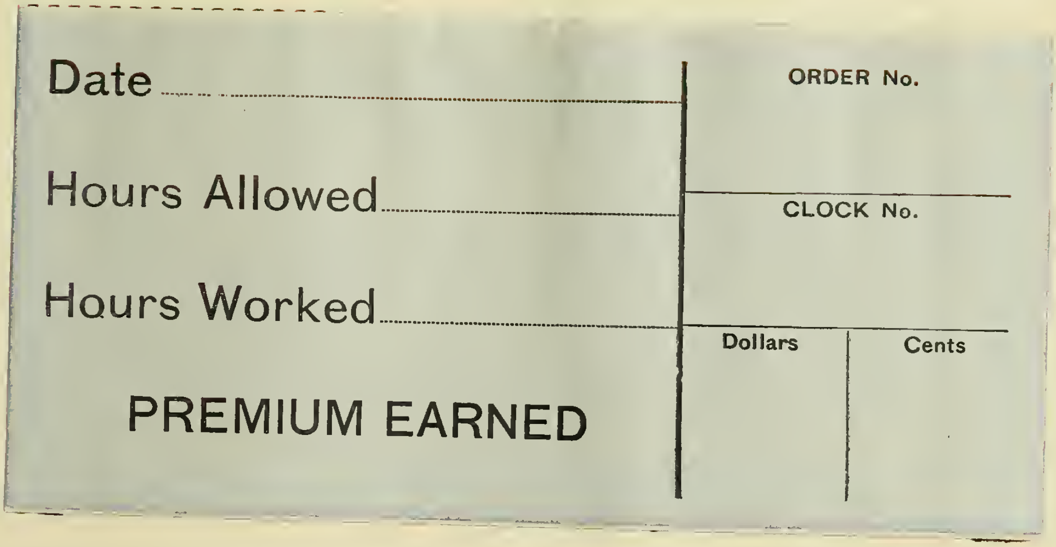
Worked

- Buff. Lathe
- Cent. Mach.
- Cut Off Mach.
- Drill Press
- H. B. Mach.
- Hyd. Press
- J. Grinder
- Key Seater
- Lathe
- Mill Mach.
- Pln. Grinder
- Planer
- Port. Grinder
- Pulley D. P.
- Shaper
- Slotter
- Testing Mach.
- Tur. Lathe
- U. Grinder
- Vt. B. Mill
- Bench
- Floor

Time	Hours on Pieces		Hours on One Piece	This Workman Made A	
Record				SUCCESS	Failure
Allowed				Success	FAILURE
STANDARD TIME ON THIS JOB IS Hrs.				SUCCESS	FAILURE
BONUS { For Doing Job in Standard Time				$	Cts.

Name.. Clock No.....................

Size	Truth	Finish	
			Inspector.



Date ....

Hours Allowed ....

Hours Worked ....

PREMIUM EARNED

ORDER No.

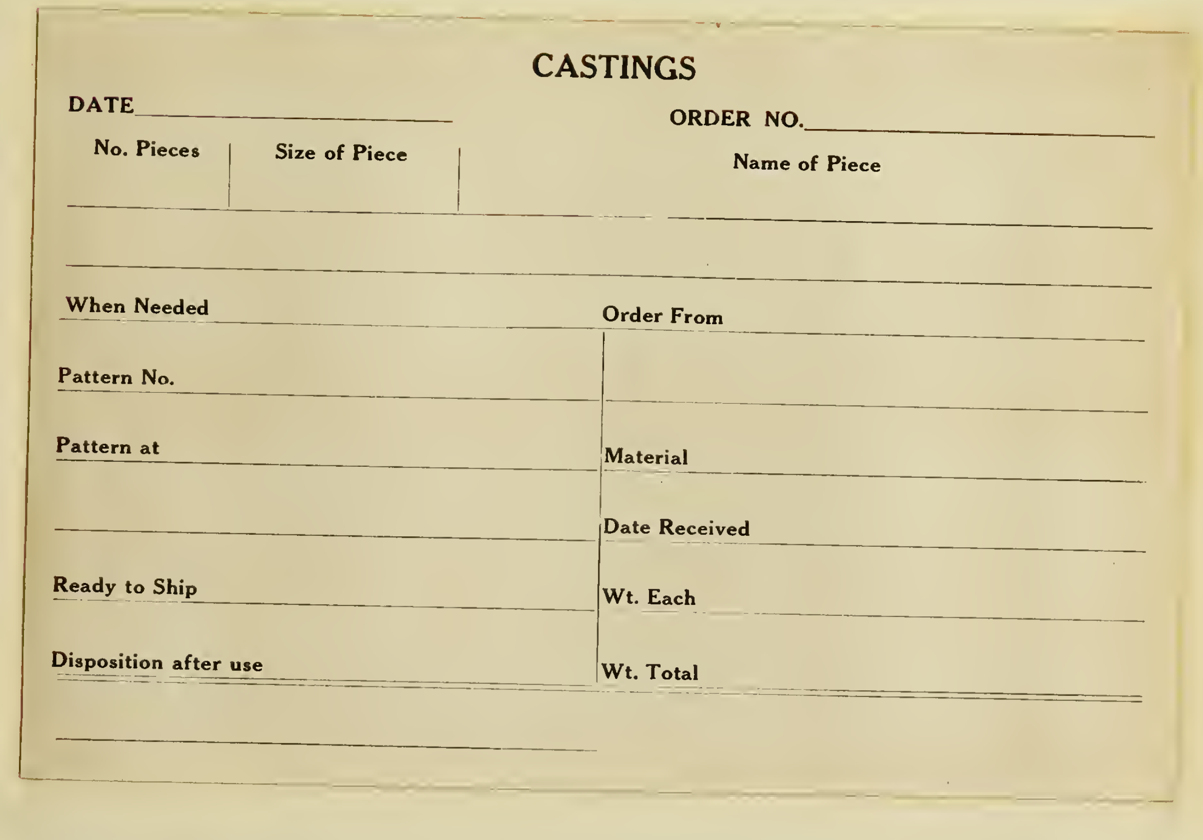
CLOCK No.

Dollars	Cents

LOST TIME

Clock No......................

Time and Date	Hours		Cause



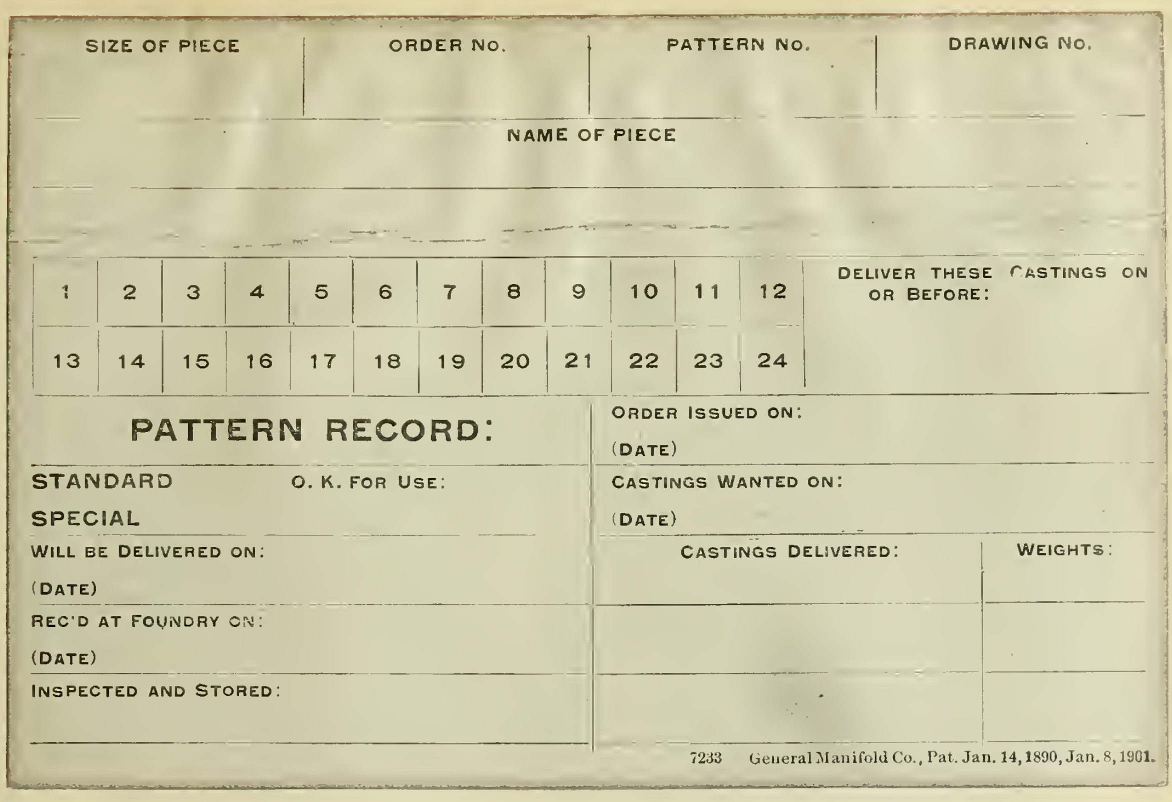
CASTINGS

DATE ______________________

ORDER NO. ______________________

No. Pieces	Size of Piece	Name of Piece

When Needed	Order From
Pattern No.	
Pattern at	Material
	Date Received
Ready to Ship	Wt. Each
Disposition after use	Wt. Total



SIZE OF PIECE	ORDER No.	PATTERN No.	DRAWING No.

NAME OF PIECE

1	2	3	4	5	6	7	8	9	10	11	12
13	14	15	16	17	18	19	20	21	22	23	24

Deliver these Castings on or Before:

PATTERN RECORD:

STANDARD O. K. For Use:

SPECIAL

Will be Delivered on:
(Date)

Rec'd at Foundry on:
(Date)

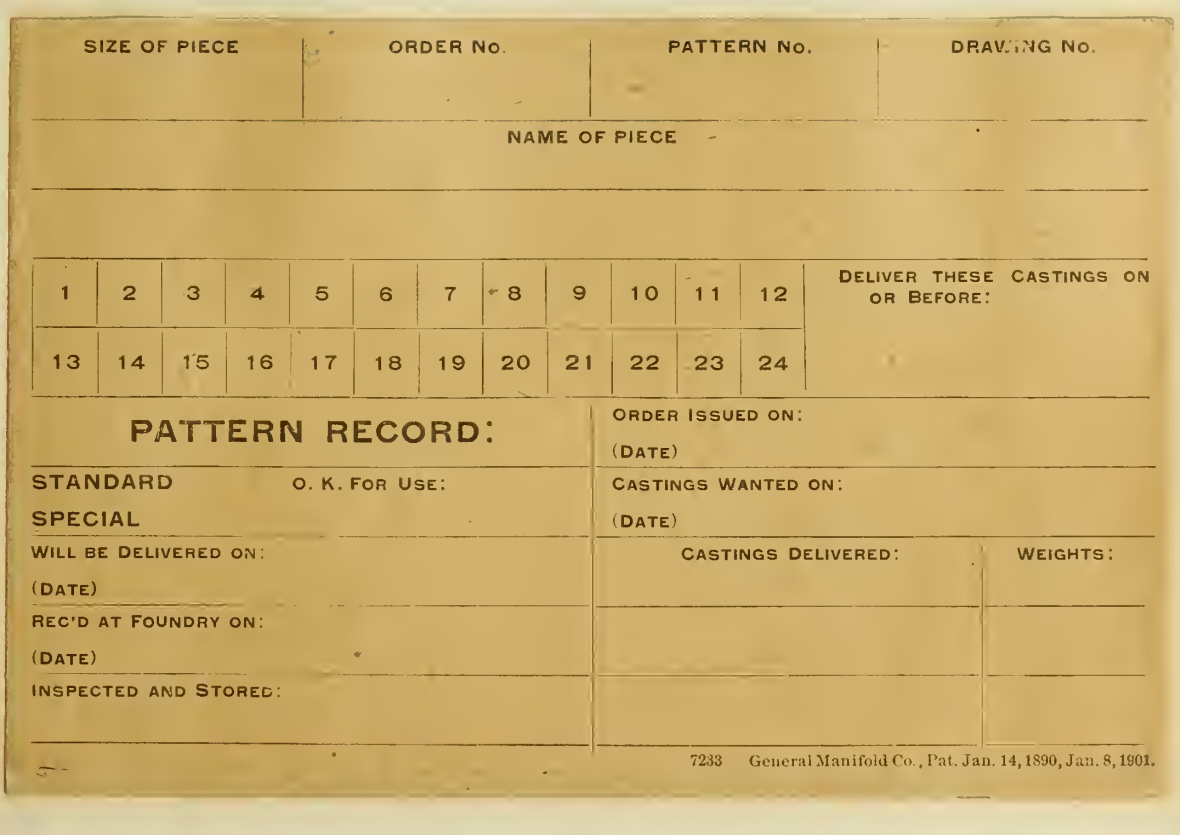
Inspected and Stored:

Order Issued on:
(Date)

Castings Wanted on:
(Date)

Castings Delivered:	Weights:

7233 General Manifold Co., Pat. Jan. 14, 1890, Jan. 8, 1901.



SIZE OF PIECE	ORDER No.	PATTERN No.	DRAWING No.

NAME OF PIECE

1	2	3	4	5	6	7	8	9	10	11	12
13	14	15	16	17	18	19	20	21	22	23	24

Deliver these Castings on or Before:

PATTERN RECORD:

STANDARD O. K. For Use:

SPECIAL

Will be Delivered on:
(Date)

Rec'd at Foundry on:
(Date)

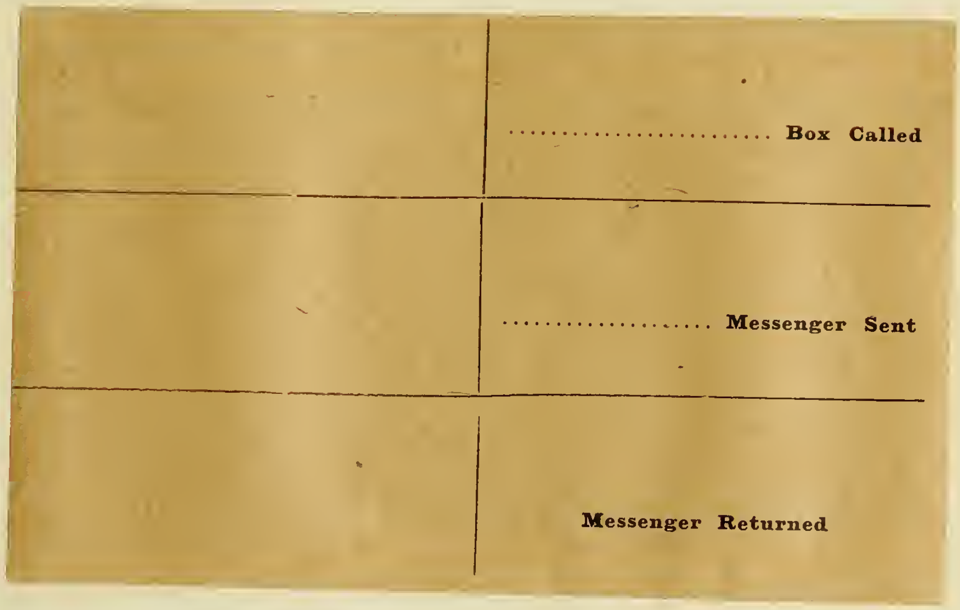
Inspected and Stored:

Order Issued on:
(Date)

Castings Wanted on:
(Date)

Castings Delivered:	Weights:

7233 General Manifold Co., Pat. Jan. 14, 1890, Jan. 8, 1901.



	.... **Box Called**
	.... **Messenger Sent**
	Messenger Returned

The Root and Vandervort Company, manufacturers of gas and gasoline engines have furnished such forms as they use in their general offices, for cost keeping.

In the factory they follow the general method of cost keeping by using cards for production orders, and sub-orders to the different departmants, material orders, and also they use both the piece rate and premium plan of paying labor and the day work system.

The forms of this company are shown on pages 52 to 54 inclusive.

These forms are interesting in that the loose leaf filing book system is used throughout and filed under an index system. In this system it is possible to "follow up" all reports on any particular job or order and from the indexed files collect any data necessary for reference to present orders. In this plant where all their product is of standard sizes, it is only necessary to refer to like orders to become cognizant of cost values of an order to be filled.

In this company the machine rate once determined is only to be increased or decreased according to the output, and the non-productive labor rate is easily determined.

The loose leaf system has this advantage over the ledger form of book-keeping, that no double entry is required and much less time is required to check on orders as the leaves can be quickly taken from the file and taken to any department for checking or comparison.

SHEET N

RECAPIT

FORM R 19
BAKER-VAWTER CO.,

NO.

ACCOUNT NO.______________

RECAPITULATION OF

FORM R 19
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO. NEW YORK

NO.	AMOUNT	NO.	AMOUNT	NO.	AMOUNT

SHEET NO ________ THE ROOT & VANDERVOORT ENGINEERING CO. ACCOUNT NO.________

RECAPITULATION OF FOR

FORM R 19
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO NEW YORK

NO.	AMOUNT	NO.	AMOUNT	NO.	AMOUNT	NO.	AMOUNT	NO.	AMOUNT	NO.	AMOUNT	NO.	AMOUNT

ACCOUNT NO.

THE ROOT & VANDERVOORT ENGINEERING CO.

SHEET NO.

RECAPITULATION OF

FOR

FORM R 19
BAKER-VAWTER CO. MANUFACTURERS, CHICAGO, NEW YORK

NO.	AMOUNT	NO.	AMOUNT	NO.	AMOUNT	NO.	AMOUNT	NO.	AMOUNT	NO.	AMOUNT	NO.	AMOUNT

DERVOORT ENGINEERING CO.

SHEET NO.

FOR

O.	AMOUNT	NO.	AMOUNT	NO.	AMOUNT	NO.	AMOUNT

RE

FORM
BAKER

DA

PRODUCT____________________

THE ROOT & VAN

RECAPITULATION OF SALE AND COST PRICE FOR PE

FORM R29
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO. NEW YORK

DATE	NO.	SALE	COST	DATE	NO.

THE ROOT & VANDERVOORT ENGINEERING CO.

PRODUCT

RECAPITULATION OF SALE AND COST PRICE FOR PERIOD OF

FORM R29
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO NEW YORK

DATE	NO.	SALE	COST	DATE	NO.	SALE	COST	DATE	NO.	SALE	COST

PRODUCT

RECAPITULATION OF SALE AND COST PRICE FOR PERIOD OF

FORM R29
BAKER-VAWTER CO. MANUFACTURERS, CHICAGO NEW YORK

DATE	NO.	SALE	COST	DATE	NO.	SALE	COST	DATE	NO.	SALE	COST

RIOD OF

SALE	COST	DATE	NO.	SALE	COST	

THE ROOT & VA

STATE

FORM R3
BAKER-VAWTER

Acct. No.	
100	
101	
102	
103	
104	
105	
106	
107	I
108	A
109	T
110	I
111	C
112	E
113	
114	M
115	A
116	T
117	P
118	C
119	P
120	
121	D
122	D
123	E
124	F
125	I
126	M
127	P
128	R
129	R
130	R
131	S
132	T
133	
134	
135	
136	
137	

STATEMENT OF FOUNDRY ACCOUNT FOR PERIOD O

FORM R3
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO, NEW YORK

Acct. No.	ACCOUNT NAME	Pro Rate	THIS
	FOUNDRY ACCOUNTS		
	MATERIAL USED		
150	Pig Iron		
151	Scrap Iron		
152	Coke		
153	Stock Room Material		
154	Flasks		
155	Supplies		
156			
157			
	LABOR AND EXPENSE		
158	Cupola		
159	Moulding		
160	Core Making		
161	General Labor		
162	Supt. and Office		
163	General Expense		
164			
165			
166			
167			
	TOTAL		

STATEMENT OF MANUFACTURING ACCOUNTS FOR PERIOD OF MONTHS ENDING 190

FORM R3
BAKER-VAWTER, MANUFACTURERS, CHICAGO NEW YORK

Acct. No.	ACCOUNT NAME		TO DATE				CURRENT MONTH				
			Pro Rate	THIS YEAR	LAST YEAR	DIFFERENCE	Pro Rate	THIS YEAR	LAST YEAR	DIFFERENCE	%
	MANUFACTURING ACCOUNTS										
100	Material Used Machine	Dept. A									
101	Material Used Assembling	Dept. B									
102	Material Used Testing	Dept. C									
103	Material Used Painting	Dept. D									
104	Material Used Crating and Shipping	Dept. E									
105	Material Used Pattern	Dept. F									
106											
	PRODUCTIVE LABOR										
107	Machine	Dept. A									
108	Assembling	Dept. B									
109	Testing	Dept. C									
110	Painting	Dept. D									
111	Crating and Shipping	Dept. E									
112	Pattern	Dept. F									
113											
	NON-PRODUCTIVE LABOR AND SUPPLIES										
114	Machine	Dept. A									
115	Assembling	Dept. B									
116	Testing	Dept. C									
117	Painting	Dept. D									
118	Crating and Shipping	Dept. E									
119	Pattern	Dept. F									
120											
	GENERAL EXPENSE										
121	Depreciation										
122	Designing										
123	Experimental										
124	Freight and Drayage										
125	Insurance										
126	Miscellaneous										
127	Power House										
128	Repairs on Machinery and Tools										
129	Repairs on Buildings										
130	Receiving and Stockkeeping										
131	Salaries										
132	Taxes										
133											
134											
135											
136											
137											
		TOTAL									

THE ROOT & VANDERVOORT ENGINEERING CO.

STATEMENT OF FOUNDRY ACCOUNT FOR PERIOD OF MONTHS ENDING 190

FORM R3
BAKER-SAWYER CO. MANUFACTURERS, CHICAGO NEW YORK

Act. No.	ACCOUNT NAME	TO DATE					CURRENT MONTH				
		Pro Rate	THIS YEAR	LAST YEAR	DIFFERENCE	%	Pro Rate	THIS YEAR	LAST YEAR	DIFFERENCE	%
	FOUNDRY ACCOUNTS										
	MATERIAL USED										
150	Pig Iron										
151	Scrap Iron										
152	Coke										
153	Stock Room Material										
154	Flasks										
155	Supplies										
156											
157											
	LABOR AND EXPENSE										
158	Cupola										
159	Moulding										
160	Core Making										
161	General Labor										
162	Supt. and Office										
163	General Expense										
164											
165											
166											
167											
	TOTAL										

DERVOORT ENGINEERING CO.

MONTHS ENDING 190

TO DATE				CURRENT MONTH				
AR	LAST YEAR	DIFFERENCE	%	Pro Rate	THIS YEAR	LAST YEAR	DIFFERENCE	%

THE ROOT & V

STATE

FORM R2
BAKER-VAWTER (

Acct. No.	
1	Offic
2	Banl
3	Banl
4	Banl
5	
6	Acco
7	Note
8	
9	
10	
	Pers(
11	Mate
12	Man
13	Foun
14	Foun
15	Lum
16	
17	
18	Real
19	Build
20	Mach
21	Office
22	Foun
23	Patte
24	Powe
25	Adve
26	
27	
28	
29	Real
30	Buildi
31	Machi
32	Office
33	Found
34	Patter
35	Power

STATEMENT OF REVENUES AND EXPENSES FOR F

FORM R2
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO, NEW YORK

Acct. No.	ACCOUNT NAME	THIS YEAR
	REVENUES	
62	Gasoline Engine Sales	
63	Repair Sales	
64	Foundry Sales	
65	Jobbing Sales	
66		
67		
	GAINS	
68	Discount Earned	
69	Interest Earned	
70	Junk Sales	
71		
72		
	TOTAL REVENUES	
	EXPENSES	
	ADMINISTRATIVE EXPENSE	
73	Advertising	
74	Collection and Exchange	
75	Commission	
76	Interest	
77	Legal Expense	
78	Miscellaneous	
79	Postage	
80	Salaries	
81	Telegrams and Telephone	
82	Traveling Expense	
83		
84		
85		
	COST OF GOODS SHIPPED	
86	Gasoline Engines	
87	Repairs	
88	Foundry	
89	Jobbing	
90		
91		
	LOSS ACCOUNTS	
92	Discount Allowed	
93	Rebates and Allowances	
94	Estimated Losses	
95		
	TOTAL EXPENSES	

THE ROOT & VANDERVOORT ENGINEERING CO.

STATEMENT OF ASSETS AND LIABILITIES

190

FORM R2
BAKER-VAWTER CO. MANUFACTURERS, CHICAGO NEW YORK

Acct. No.	ACCOUNT NAME		DETAIL	TOTAL
	ASSETS			
	CASH ACCOUNTS			
1	Office Fund			
2	Bank			
3	Bank			
4	Bank			
5				
	BOOK ACCOUNTS			
6	Accounts Receivable			
7	Notes Receivable			
8				
9				
10				
	Personal Accounts			
	INVENTORY ACCOUNTS			
11	Material and Supplies			
12	Manufacturing			
13	Foundry Material			
14	Foundry			
15	Lumber			
16				
17				
	PLANT ACCOUNTS			
18	Real Estate			
19	Buildings			
20	Machinery and Tools			
21	Office Furniture			
22	Foundry Equipment			
23	Patterns and Drawings			
24	Power and Heating Plant			
25	Advertising Equipment			
26				
27				
28				
	BETTERMENTS			
29	Real Estate			
30	Buildings			
31	Machinery and Tools			
32	Office Furniture			
33	Foundry Equipments			
34	Patterns and Drawings			
35	Power and Heating Plant			
	Assets Forward			

Acct. No.	ACCOUNT NAME		DETAIL	TOTAL
	Assets Forwarded			
36	Advertising Equipment			
37				
38				
39				
	MISCELLANEOUS ASSETS			
40	Advanced Insurance			
41	Advanced Interest			
42	Advanced Advertising			
43	Patents			
44	Treasury Stock			
45				
46				
	Total Assets			
	LIABILITIES			
	CAPITAL ACCOUNTS			
47	Capital Stock			
48	Surplus			
49	Loss and Gain			
50	Reserve for Depreciation			
51	Reserve for Losses			
52				
53				
	OUTSIDE LIABILITIES			
54	Accounts Payable			
55	Notes Payable			
56	Accrued Taxes			
57	Accrued Interest			
58	Accrued Labor			
59				
60				
61				
	Personal Accounts			
	Total Liabilities			
	RECAPITULATION			
	Assets Dr.			
	Liabilities Cr.			
	Expenses Dr.			
	Revenues Cr.			
	Trial Balance			

THE ROOT & VANDERVOORT ENGINEERING CO.

STATEMENT OF REVENUES AND EXPENSES FOR PERIOD OF MONTHS ENDING 190

FORM R2
BAKER-VAWTER CO. MANUFACTURERS CHICAGO NEW YORK

Act. No.	ACCOUNT NAME	TO DATE				CURRENT MONTH			
		THIS YEAR	LAST YEAR	DIFFERENCE	%	THIS YEAR	LAST YEAR	DIFFERENCE	%
	REVENUES								
62	Gasoline Engine Sales								
63	Repair Sales								
64	Foundry Sales								
65	Jobbing Sales								
66									
67									
	GAINS								
68	Discount Earned								
69	Interest Earned								
70	Junk Sales								
71									
72									
	TOTAL REVENUES								
	EXPENSES								
	ADMINISTRATIVE EXPENSE								
73	Advertising								
74	Collection and Exchange								
75	Commission								
76	Interest								
77	Legal Expense								
78	Miscellaneous								
79	Postage								
80	Salaries								
81	Telegrams and Telephone								
82	Traveling Expense								
83									
84									
85									
	COST OF GOODS SHIPPED								
86	Gasoline Engines								
87	Repairs								
88	Foundry								
89	Jobbing								
90									
91									
	LOSS ACCOUNTS								
92	Discount Allowed								
93	Rebates and Allowances								
94	Estimated Losses								
95									
	TOTAL EXPENSES								

DERVOORT ENGINEERING CO.

RIOD OF MONTHS ENDING 190

TO DATE			CURRENT MONTH			
LAST YEAR	DIFFERENCE	%	THIS YEAR	LAST YEAR	DIFFERENCE	%

THE ROOT & VAN

COMPA

FORM R 20
BAKER-VAWTER

DAY

COMPARATIVE STATEMENT OF

FORM R 20
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO. NEW YORK

DAY	JANUARY	V

COMPARATIVE STATEMENT OF FOR

FORM R 20
BAKER-VAWTER CO. MANUFACTURERS, CHICAGO, NEW YORK

DAY	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL THIS YEAR	TOTAL LAST YEAR	DIFFERENCE

COMPARATIVE STATEMENT OF FOR

FORM R20
BAKER-VAWTER CO. MANUFACTURERS, CHICAGO NEW YORK

	DAY	JANUARY	√	FEBRUARY	√	MARCH	√	APRIL	√	MAY	√	JUNE	√

FOR

FEBRUARY	√	MARCH	√	APRIL	√	MAY	√	JUNE	√

JOURNAL

FORM R17
BAKER-VAWTER CO., MANU

DAY

THE ROOT & V

SHEET NO.____________

JOURNAL ENTRIES FOR THE MONTH OF

FORM R 17
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO, NEW YORK

DAY	DESCRIPTION OF ENTRY	Acct. No.

THE ROOT & VANDERVOORT ENGINEERING CO.

SHEET NO. ______

JOURNAL ENTRIES FOR THE MONTH OF 190

FORM R 17
BAKER-VAWTER CO., MANUFACTURERS CHICAGO NEW YORK

PATENTED APRIL 11, 1899

DAY	DESCRIPTION OF ENTRY	Acct. No.	GENERAL LEDGER			ACCOUNTS RECEIVABLE			ACCOUNTS PAYABLE		
			CHARGES	\	CREDITS	CHARGES	\	CREDITS	CHARGES	\	CREDITS

SHEET NO ______

THE ROOT & VANDERVOORT ENGINEERING CO.

JOURNAL ENTRIES FOR THE MONTH OF 190

FORM 517
BAKER-VAWTER CO. MANUFACTURERS CHICAGO NEW YORK

PATENTED APRIL 11, 1899

DAY	DESCRIPTION OF ENTRY	Acct. No.	GENERAL LEDGER			ACCOUNTS RECEIVABLE			ACCOUNTS PAYABLE		
			CHARGES	√	CREDITS	CHARGES	√	CREDITS	CHARGES	√	CREDITS

190

PATENTED APRIL 11, 1899.

GENERAL LEDGER			ACCOUNTS RECEIVABLE			ACCOUNTS PAYABLE		
CHARGES	√	CREDITS	CHARGES	√	CREDITS	CHARGES	√	CREDITS

IN A

FORM R 1
BAKER-VAV

DAY

THE ROOT & VANDERVOORT ENGINEERING CO.

IN ACCOUNT WITH BANK FOR THE MONTH OF 190

FORM 116
BAKER-VAWTER CO. MANUFACTURERS, CHICAGO NEW YORK

PATENTED APRIL 11, 1899

		DAILY STATEMENT						OUTSTANDING CHECKS							
DAY	DESCRIPTION	DEPOSITS	✓	CHECKS	✓	BALANCE	✓	NO.	✓	AMOUNT	✓	NO.	✓	AMOUNT	✓
	Balance Forwarded														
	Our Balance														
	Outstanding Checks														
	Bank Balance														

RECORD

FORM R 15
BAKER-VAWTER CO.

DAY	

SHEET NO.____________

THE ROOT & VA

RECORD OF CHECKS DRAWN ON

FORM R 15
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO, NEW YORK

DAY	PAYABLE TO ORDER OF	DESCRIPTION
		Forward
		Forwa

THE ROOT & VANDERVOORT ENGINEERING CO.

SHEET NO.__________

RECORD OF CHECKS DRAWN ON FOR THE MONTH OF 190

FORM R 15
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO, NEW YORK

PATENTED APR 1, 1899

DAY	PAYABLE TO ORDER OF	DESCRIPTION	CHARGE GENERAL LEDGER			✓	CHARGE ACCOUNTS PAYABLE	CREDIT DISCOUNT EARNED	CREDIT BANK		
			Acct. No.	✓	AMOUNT				CHECK NO.	AMOUNT OF CHECK	DAILY TOTAL
		Forwarded									
		Forward									

HE ROOT & VANDERVOORT ENGINEERING CO.

SHEET NO ________

RECORD OF CHECKS DRAWN ON FOR THE MONTH OF 190

FORM R 15
BAKER-VAWTER CO. MANUFACTURERS CHICAGO, NEW YORK

PATENTED APRIL 11, 1899

DAY	PAYABLE TO ORDER OF	DESCRIPTION	CHARGE GENERAL LEDGER			√	CHARGE ACCOUNTS PAYABLE	CREDIT DISCOUNT EARNED	CREDIT BANK		
			Acct. No.	√	AMOUNT				CHECK NO.	AMOUNT OF CHECK	DAILY TOTAL
		Forwarded									
		Forward									

DERVOORT ENGINEERING CO.

FOR THE MONTH OF 190

PATENTED APRIL 11, 1899

CHARGE GENERAL LEDGER			√	CHARGE ACCOUNTS PAYABLE	CREDIT DISCOUNT EARNED	CREDIT BANK		
Acct. No.	√	AMOUNT				CHECK NO.	AMOUNT OF CHECK	DAILY TOTAL

ed

rd

RECORD

FORM R 14
BAKER-VAWTER CO., N

DAY

THE ROOT & VA

SHEET NO.______

RECORD OF COLLECTIONS FOR THE MONTH OF

FORM R 14
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO. NEW YORK

DAY	NAME
	Forwarded
	Forward

THE ROOT & VANDERVOORT ENGINEERING CO.

SHEET NO.

RECORD OF COLLECTIONS FOR THE MONTH OF 190

FORM R 14
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO, NEW YORK

PATENTED APRIL 11, 1899

DAY	NAME	√	CREDIT ACCOUNTS RECEIVABLE	CHARGE DISCOUNT	CHARGE MISCELLANEOUS			CREDIT GENERAL LEDGER			CHARGE BANK	
					Acct No.	√	AMOUNT	Acct. No.	√	AMOUNT	AMOUNT RECEIVED	DAILY TOTAL
	Forwarded											
	Forward											

SHEET NO.__________

THE ROOT & VANDERVOORT ENGINEERING CO.

RECORD OF COLLECTIONS FOR THE MONTH OF 190

[illegible]
[illegible] CHICAGO NEW YORK

PATENTED APRIL 11, 1899

DAY	NAME	✓	CREDIT ACCOUNTS RECEIVABLE	CHARGE DISCOUNT	CHARGE MISCELLANEOUS			CREDIT GENERAL LEDGER			CHARGE BANK	
					Acct. No.	✓	AMOUNT	Acct. No.	✓	AMOUNT	AMOUNT RECEIVED	DAILY TOTAL
	Forwarded											
	Forward											

190

PATENTED APRIL 11, 1899

CREDIT ACCOUNTS RECEIVABLE	CHARGE DISCOUNT	CHARGE MISCELLANEOUS			CREDIT GENERAL LEDGER			CHARGE BANK	
		Acct. No.	✓	AMOUNT	Acct. No.	✓	AMOUNT	AMOUNT RECEIVED	DAILY TOTAL

RECORD O

FORM R 18
BAKER-VAWTER CO., MAN

INVOICE	
NO.	DAT

SHEET NO.____________

THE ROOT & VA

RECORD OF APPROVED INVOICES TAKEN INTO ACCOU

FORM R 18
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO. NEW YORK

INVOICE		DAY ENT.	NAME
NO.	DATE		

THE ROOT & VANDERVOORT ENGINEERING CO.

SHEET NO.________

RECORD OF APPROVED INVOICES TAKEN INTO ACCOUNT FOR THE MONTH OF 190

FORM R 18
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO NEW YORK

PATENTED APRIL 11, 1899

INVOICE		DAY ENT.	NAME	ACCOUNTS AFFECTED	√	CREDIT ACCOUNTS PAYABLE	DATE PAID	CHARGE MISCELLANEOUS			
NO.	DATE							DESCRIPTION	ACCT. NO.	√	AMOUNT
			Forwarded								
			Forward								

THE ROOT & VANDERVOORT ENGINEERING CO.

SHEET NO __________

RECORD OF APPROVED INVOICES TAKEN INTO ACCOUNT FOR THE MONTH OF 190

FORM R18
BAKER-VAWTER CO. MANUFACTURERS, CHICAGO NEW YORK

PATENTED APRIL 11, 1899

INVOICE		DAY ENT.	NAME		ACCOUNTS AFFECTED	√	CREDIT ACCOUNTS PAYABLE	DATE PAID	CHARGE MISCELLANEOUS			
NO	DATE								DESCRIPTION	ACCT. NO.	√	AMOUNT
				Forwarded								
				Forward								

NDERVOORT ENGINEERING CO.

IT FOR THE MONTH OF 190

PATENTED APRIL 11, 1899

	ACCOUNTS AFFECTED	√	CREDIT ACCOUNTS PAYABLE	DATE PAID	CHARGE MISCELLANEOUS			
					DESCRIPTION	ACCT. NO.	√	AMOUNT
Forwarded								
Forward								

Recapitulation of Office Fund Disbursements for the Month of 190

FORM R23
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO. NEW YORK

CHARGE ACCOUNT NUMBERS

	√		√		√		√		√		√		√		√		√

Recapitulation of Office Fund Disbursements for the Month of 190

FORM R23
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO. NEW YORK

CHARGE ACCOUNT NUMBERS

√	√	√	√	√	√	√	√	√

THE ROOT & VANDERVOORT ENGINEERING CO. SHEET NO.

Record of Office Fund Disbursements for the Month of 190

FORM R 22
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO. NEW YORK

PATENTED APRIL 11, 1899

DAY	PAID TO	VOUCHER NO.	ACCOUNT OF	ACCT. NO.	V	AMOUNT PAID
	Forwarded					
	Forward					

SHEET NO.______ THE ROOT & VANDERVOORT ENGINEERING CO.

Record of Office Fund Disbursements for the Month of 190

FORM R 22
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO. NEW YORK

PATENTED APRIL 11, 1899.

DAY	PAID TO	VOUCHER NO.	ACCOUNT OF	ACCT. NO.		AMOUNT PAID
	Forwarded					
	Forward					

SHEET NO.

PAY R

FORM R10
BAKER-VAWTER

PATENTED APRIL 11, 1899

TOTAL TIME	RATE	AMOUNT PAID	CHECK NO.	V

THE ROOT & VANDERVOORT ENGINEERING CO.

SHEET NO ________

PAY ROLL FOR PERIOD ENDING 190

FORM R10
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO NEW YORK

PATENTED APRIL 11, 1899

	NAME	CLOCK NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		TOTAL TIME	RATE	AMOUNT PAID	CHECK NO.	
			16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31					

FOUNDRY

FORM R32
BAKER-VAWTER CO., MA

	DAY	No. Charges

GRADE

FOUNDRY RECORD FOR THE MONTH OF 190

FORM R32
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO, NEW YORK
PATENTED APR [illegible]

DAY	No. Charges	MATERIAL USED AT CUPOLA								GOOD CASTINGS PRODUCED		
		COKE	SCRAP	SCRAP	PIG	PIG	PIG	CREDITS	WASTE	A	B	C

GRADE	SUMMARY	WEIGHT GROSS	WEIGHT NET	TONS	PRICE	AMOUNT	GOOD CASTINGS		lb. Price	AMOUNT
	Scrap						Grade	Weight	lb. Price	
	Less Credits						A			
	Pig Iron						B			
	Less Credits						C			
	Coke									
	Less Credits									
	Total Material Used at Cupola									
	Stock Room Material									
	Flasks									
	Supplies									
	Labor									
	General Expense									
	Total Cost							TOTAL		
	Ton Cost									
	Lb. Cost									

THE ROOT & VANDER

DATE STARTED 190 ARTIC

SIZE O

DATE FINISHED 190 KIND

FORM R11

BAKER-VAWTER CO., MANUFACTURERS, CHICAGO. NEW YORK

DEPT.			DEPT.			DEPT.	
DATE	LABOR	MATERIAL	DATE	LABOR	MATERIAL	DATE	LABO

SUMMARY OF LABOR

FORM R11

BAKER-VAWTER CO., MANUFACTURERS, CHICAGO. NE

DESCRIPTIO

Machine Shop Productive
Add % Non-Prod. and
Add Material Used
Assembling Productive
Add % Non-Prod. and
Add Material Used
Testing Productive
Add % Non-Prod. and
Add Material Used
Painting Productive
Add % Non-Prod. and
Add Material Used
Crating and Shipping Productive
Add % Non-Prod. and
Add Material Used
Pattern Productive
Add % Non-Prod. and
Add Material Used

Add % General Expen

THE ROOT & VANDERVOORT ENGINEERING CO.

COST RECORD

DATE STARTED 190 ARTICLE ORDER NO.

DATE FINISHED 190 SIZE OR KIND QUANTITY

FORM [illegible]
BAKER-VAWTER CO. [illegible] CHICAGO NEW YORK

DEPT.			DEPT.			DEPT.			DEPT.			DEPT		
DATE	LABOR	MATERIAL	DATE	LABOR	MATERIAL	DATE	LABOR	MATERIAL	DATE	LABOR	MATERIAL	DATE	LABOR	MATERIAL

THE ROOT & VANDERVOORT ENGINEERING CO.

SUMMARY OF LABOR AND MATERIAL COSTS ON ORDER NO.

FORM 811
BAKER VAWTER CO., MANUFACTURERS, CHICAGO, NEW YORK

COST SUMMARY					CREDITS	
DESCRIPTION		DETAIL	DEPT. COST	TOTAL SHOP COST	DESCRIPTION	AMOUNT
Machine Shop Productive	Dept. A					
Add % Non-Prod. and Supplies						
Add Material Used						
Assembling Productive	Dept. B					
Add % Non-Prod. and Supplies						
Add Material Used						
Testing Productive	Dept. C					
Add % Non-Prod. and Supplies						
Add Material Used						
Painting Productive	Dept. D					
Add % Non-Prod. and Supplies						
Add Material Used						
Crating and Shipping Productive	Dept. E					
Add % Non-Prod. and Supplies						
Add Material Used						
Pattern Productive	Dept. F					
Add % Non-Prod. and Supplies						
Add Material Used						
Total Dept. Cost						
Add % General Expense						
Total Shop Cost						

MEMORANDUM

THE ROOT & VANDERVOORT ENGINEERING CO.

AND MATERIAL COSTS ON ORDER NO.

ORK

COST SUMMARY					CREDITS	
		DETAIL	DEPT. COST	TOTAL SHOP COST	DESCRIPTION	AMOUNT
	Dept. A					
Supplies						
	Dept. B					
Supplies						
	Dept. C					
Supplies						
	Dept. D					
Supplies						
	Dept. E					
Supplies						
	Dept. F					
Supplies						
Total Dept. Cost						
e						
Total Shop Cost						

MEMORANDUM

INVENTORY THE ROOT & VAN DERVOORT ENGINEERING CO. SHEET NO.

LOCATION DATE 190

CALLED BY COUNTED OR WEIGHED BY PRICED BY

EXTENDED BY EXTENSIONS CHECKED BY DEPT.

FORM R-1

BAKER-VAWTER CO., MANUFACTURERS, CHICAGO. NEW YORK

QUANTITY	UNIT OF MEASURE	DESCRIPTION	PRICE	PER	AMOUNT	✓

SHEET NO.________ THE ROOT & VANDERVOORT ENGINEERING CO. ACCOUNT NO.________

ACCOUNT NAME

FORM R 21
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO. NEW YORK

PATENTED APRIL 11, 1899.

DATE	CHARGES				DATE	CREDITS			
190	DESCRIPTION	POSTING REF.	√	AMOUNT	190	DESCRIPTION	POSTING REF.	√	AMOUNT

ACCOUNT NO.__________ THE ROOT & VANDERVOORT ENGINEERING CO. SHEET NO.__________

ACCOUNT NAME

FORM R21

BAKER-VAWTER CO., MANUFACTURERS, CHICAGO. NEW YORK

PATENTED APRIL 11, 1899.

DATE	CHARGES				DATE	CREDITS			
190	DESCRIPTION	POSTING REF.	√	AMOUNT	190	DESCRIPTION	POSTING REF.	√	AMOUNT

PATTERN RECORD

THE ROOT & VANDERVOORT ENGINEERING CO. *SYMBOL NO.*

COST *NAME OF PATTERN*

FORM R12
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO. NEW YORK

PATENTED APRIL 11, 1899.

	SENT			RETURNED		
	DATE	TO	VIA	DATE	FROM	VIA

REQUEST FOR PURCHASE

THE ROOT & VANDERVOORT ENGINEERING CO.
PURCHASING DEPT.

DATE ______________ 190__

PLEASE ORDER FOR ______________ DEPARTMENT

MATERIAL AND SUPPLIES AS FOLLOWS:

FORM R-4
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO. NEW YORK

QUANTITY	DESCRIPTION	PRICE	PER
	O. K. SUPT.		

Signed ______________

FORM A-5

RECEIVING REPORT

RECEIVED VIA			RECEIVED FROM		
WHERE STORED	FREIGHT $	EXPRESS $	TOWN	STATE	
UNPACKED BY	GOODS CHECKED BY	DATE RECEIVED	DATE OF INVOICE	PURCHASE ORDER NO.	INVOICE NO.

QUANTITY RECEIVED	ARTICLE	SIZE, WEIGHT OR FEET	DISPOSITION	
			AMOUNT OF INVOICE	$
			DEDUCTIONS	
				$
			NET AMOUNT	
			DISCOUNT	
			% DAYS	
			PAY ON 190	
			PRICE CORRECT	
			EXTENSIONS "	
			ENTERED ACCTS. PAY.	
			" STOCK LEDGER	
			CHARGE ACCT. NO.	$
			" " "	$
			" " "	$

BAKER-VAWTER CO., MANUFACTURERS CHICAGO, NEW YORK

The Root & VanDervoort Engineering Co. TIME REPORT

MACHINE DEPT. A DATE 190

NAME OF WORKMAN CLOCK NO.

FORM R-8

BAKER-VAWTER CO., MANUFACTURERS, CHICAGO. NEW YORK

OPERATION	ORDER NUMBER	SYMBOL OR NAME	QUANTITY FINISHED	TIME		RATE	AMOUNT
				Hrs.	Min.		

FOREMAN'S O. K.________________

THIS REPORT MUST BE FILLED OUT BEFORE LEAVING SHOP OR NO TIME WILL BE ALLOWED.

REQUISITION

THE ROOT & VANDERVOORT ENGINEERING CO. DATE ______________________ 190__

STOCKKEEPER: PLEASE FURNISH ______________________ DEPT.

WITH MATERIAL AS STATED BELOW. SIGNED ______________________

FORM R-7

BAKER-VAWTER CO., MANUFACTURERS, CHICAGO. NEW YORK

QUANTITY	DESCRIPTION	FOR ORDER NO.	PRICE	PER	AMOUNT

ENTERED ON STOCK RECORD BY ______________________ ON COST RECORD BY ______________________

RECEIVED THE ABOVE IN GOOD ORDER ______________________ FOREMAN

The Root & VanDervoort Engineering Co.

SHOP ORDER

For

No.

Date 190 Departments

Date Completed 190 Signed

Foreman

FORM R-9

BAKER-VAWTER CO. MANUFACTURERS, CHICAGO, NEW YORK

QUANTITY TO MAKE	DESCRIPTION	DEPARTMENTS	DATE COMPLETED
	Charge Acct. No.		
	Approved by		

THE ROOT & VANDERVOORT ENGINEERING CO.
EAST MOLINE, ILL.

EMPLOYMENT RECORD

NAME

CLOCK NO.

ADDRESS

DEPT.

AGE

NATIONALITY

MARRIED OR SINGLE

WHERE LAST EMPLOYED

HOW LONG

REASONS FOR CHANGE

WHAT TRADE

HOW LONG WORKED AT IT

UNION MEMBER

WHAT UNION

WAGES ASKED

WAGES OFFERED

REFERENCES

DATE EMPLOYED 190

DATE LEFT 190

FORM R13
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO, NEW YORK

ANY CHANGES MUST BE DESCRIBED BELOW

DATE	DESCRIPTION	FROM	TO

THE ROOT & VANDERVOORT ENGINEERING CO.

STOCK RECORD

SHEET NO. *ARTICLE* *NO.*

UNIT OF MEASURE *SIZE OR KIND*

STOCK LIMIT *FREIGHT COST* *PER* *SYMBOL*

FORM R6
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO. NEW YORK

PATENTED APRIL 11, 1899.

DATE	CHARGES				DISBURSEMENTS								
RECEIVED	RECEIVED FROM	Order No.	QUANTITY	COST	DATE	USED	ON HAND	DATE	USED	ON HAND	DATE	USED	ON HAND

JOURNAL MEMORANDUM

NO. __________

THE ROOT & VANDERVOORT ENGINEERING CO. *EAST MOLINE, ILL.* *190*

BOOKKEEPER: ENTER THE FOLLOWING: AUTHORITY

FORM R28
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO. NEW YORK

CHARGE

TOTAL

CREDIT

TOTAL

DEBIT MEMORANDUM

No.

The Root & VanDervoort Engineering Co.
MANUFACTURERS

EAST MOLINE, ILL.,

To

WE CHARGE YOUR ACCOUNT AS FOLLOWS:

Address

FORM R-27
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO, NEW YORK

QUANTITY	DESCRIPTION	PRICE	EXTENSION	AMOUNT

CASH VOUCHER

NO. 101

The Root & VanDervoort Engineering Co.

DATE ____________ 190__

Disbursements from Office Fund must be evidenced on this Voucher and
FORM R-25 signed by the person receiving the money.

DESCRIPTION	Charge Acct. No.	Detail		Total	

Approved by ____________________

Received Payment ____________________

DEBIT MEMORANDUM

No.

The Root & VanDervoort Engineering Co.
MANUFACTURERS

EAST MOLINE, ILL.,

To

Address

WE CHARGE YOUR ACCOUNT AS FOLLOWS:

FORM R-27
BAKER-VAWTER CO., MANUFACTURERS, CHICAGO, NEW YORK

QUANTITY	DESCRIPTION	PRICE	EXTENSION	AMOUNT

VOUCHER

The Root & VanDervoort Engineering Co.
MANUFACTURERS

No.

EAST MOLINE, ILL., 190

AUDITED BY

IN FAVOR OF

APPROVED BY

FORM R-24

ALL ITEMS FOR WHICH THERE IS NO INVOICE MUST BE EVIDENCED ON THIS VOUCHER.

BAKER-VAWTER CO., MANUFACTURERS CHICAGO, NEW YORK

	DESCRIPTION	ACCT. NO.	DETAIL	TOTAL

FORM R-26

ADVANCE AND DISCHARGE VOUCHER

The Root & VanDervoort Engineering Co.
MANUFACTURERS

EAST MOLINE, ILL., 190

Change wage rate for
TIMEKEEPER: Make out time in full for *Clock No.*
Beginning
up to 190 inclusive. *Signed* *Foreman*

CASHIER: Pay the above Employee $ being the amount due in full to date.

Time @ per amount earned less deductions for

amounting to No. checks charged No. checks returned

Tools charged

Signed *Timekeeper*

Received of The Root & VanDervoort Engineering Co. the above amount in full payment of all demands.

Signed *Employee*

Change wage rate from to beginning with 19

Reasons

Signed *Foreman*

ABOVE APPROVED BY SUPT.

FORM R-26

ADVANCE AND DISCHARGE VOUCHER

The Root & VanDervoort Engineering Co.
MANUFACTURERS

EAST MOLINE, ILL., 190

Change wage rate for
TIMEKEEPER: Make out time in full for Clock No.

Beginning
up to 190 *inclusive.* *Signed* Foreman

CASHIER: Pay the above Employee $ *being the amount due in full to date.*

Time @ *per* *amount earned* *less deductions for*

amounting to *No. checks charged* *No. checks returned*

Tools charged

Signed Timekeeper

Received of The Root & VanDervoort Engineering Co. the above amount in full payment of all demands.

Signed Employee

Reasons for Leaving
Discharge

Change wage rate from *to* *beginning with* 19

Reasons

Signed Foreman

ABOVE APPROVED BY *SUPT.*

TALLY CARD

The Root & VanDervoort Engineering Co. Date ______________ 190__

GOOD CASTINGS PRODUCED TO-DAY

FORM R-31

BAKER-VAWTER CO., MANUFACTURERS, CHICAGO, NEW YORK

WEIGHTS

DISPOSITION	DETAIL	TOTAL

The International Harvester Company's monthly exhibit forms are shown on pages beginning on page

This company is a consolidation of the plants which formerly manufactured the harvesting machines put on the market under the names, Champion, Deering, McCormick, Milwaukee, and Plano.

As the nature of the product manufactured by the International Harvester Company is different from iron and steel manufacturers, their methods of cost accounting are slightly different.

The forms used in their various plants are especially designed for their own use and it was impossible to obtain them but it may be said that these forms correspond in a general way to factory cost accounting systems already described with variations to suit their demands. The variety and nature of this company's finished product is such that a monthly cost record is neither practicable nor necessary. Instead they prepare monthly exhibits, as shown beginning page 54 , covering the most variable factors of cost, showing comparisons with previous months. These exhibits are so classified that any unusual increase in the total expense for any given month can be readily allotted to the department in which the increase occurs, and from the weekly statements of orders placed and finished machines produced it can readily be determined whether or not this expense increase is legitimate, and if not, the proper remedy is applied.

WORKS FORM 2.

INTERNATIO

Grey Iron Casting Cost Sheet No.___ F'dry______

Production	Lbs.	Average Weight Each

INTERNATIONAL HARVESTER COMPANY

Grey Iron Casting Cost Sheet No. F'dry Works Month 19

Production Lbs	Average Weight Each Lbs	Cost Per 100 Lbs		THIS MONTH	LAST MONTH
This Month	This Month	This Month	Average No. Days Worked		
Last Month	Last Month	Last Month	Average No. Men Employed		

METALS	Percentage of Metal Charge	Weight Lbs	Price	Amount. $	Stock Per 100 Lbs.	Cost Per 100 Lbs.	LAST MONTH PRACTICE Cost Per 100 Lbs	Stock Per 100 Lbs	Percentage of Metal Charge
PIG									
Total Pig									
SCRAP									
Total Scrap									
GROSS METAL									
SCRAP PRODUCED									
Less Scrap									
NET METAL									
PRODUCT									
LOSS									
MELTING									
Coke									
Limestone									
Coal									
Productive Labor	Exhibit A								
Repairs and Maintenance	" B								
General Expense	" C								
		Total (red ink)							
MOLDING									
Sand									
Coal									
Soapstone Facing									
Productive Labor	Exhibit A								
Repairs and Maintenance	" B								
General Expense	" C								
		Total (red ink)							
CORES									
Fuel Oil									
Sand									
Rosin									
Flour									
Productive Labor	Exhibit A								
Repairs and Maintenance	" B								
General Expense	" C								
		Total (red ink)							
MILLING									
Productive Labor	Exhibit A								
Repairs and Maintenance	" B								
General Expense	" C								
		Total (red ink)							
FUNDS									
TOTAL COST									

	PRACTICE THIS MONTH TONS	 %	 LAST MONTH TONS	 %
Good Castings				
Defective Castings				
Scrap				
Loss				
TOTAL				

RECAPITULATION OF COST	THIS MONTH AMOUNT	 COST 100 LBS	LAST MONTH AMOUNT	 COST 100 LBS.
Metal Charge				
Other Material				
Productive Labor				
Repairs				
Maintenance				
General Expense				
Funds				
TOTAL				

WORKS FORM 7.

INTERNATION

Grey Iron—Exhibit "A"

PRODUCTIVE LABOR	PIECE WORK	DAY
	AMOUNT	A
MELTING		
Car Loaders		
Chargers		
Coke Wheelers		
Cupola Tenders		
Slag Wheelers		
Sprue Weighers		
Cinder Millers		
MOLDING		
Molders		
Buggy Me		
Pourers		
Clampers		
Runners		
Ladle Dau		
Laborers (Cu		
CORES		
Co		
O		

INTERNATIONAL HARVESTER COMPANY

Grey Iron Exhibit "A" ________ Works. Month of ________ 19__

PRODUCTIVE LABOR	PIECE WORK	DAY WORK	GENERAL	TOTAL			
				THIS MONTH		LAST MONTH	
	AMOUNT	AMOUNT	AMOUNT	AMOUNT	COST PER 100 LBS.	AMOUNT	COST PER 100 LBS.
MELTING							
Car Loaders							
Chargers							
Coke Wheelers							
Cupola Tenders							
Slag Wheelers							
Sprue Weighers							
Cinder Millers							
TOTAL							
MOLDING							
Molders							
Buggy Men							
Pourers							
Clampers							
Runners							
Ladle Daubers							
Laborers (Cutting Sand and Dressing up Floors)							
TOTAL							
CORES							
Core Makers							
Oven Tenders							
Wire Boys							
Core Carriers							
Sand Wheelers							
TOTAL							
MILLING							
Mill Men							
Chipping							
Laborers (Delivering Castings to Mill Room)							
Conveying Castings from Mill Room							
TOTAL							
TOTAL PRODUCTIVE LABOR							

WORKS FORM 8.

INTERNATIO

Grey Iron—Exhibits "B" and "C" No.___ Fd'ry________

EXHIBIT "B"	DEPARTMENTAL	
	Melting	Moldin
REPAIRS		
Cupola		
Core Ovens		
Flasks		
Flasks Weights		
Patterns		
Bottom Boards		

INTERNATIONAL HARVESTER COMPANY

Gray Iron Exhibits "B" and "C" No. Fd'ry___ Works. Month ___ 19__

EXHIBIT "B"	DEPARTMENTAL REPAIRS AND MAINTENANCE				TOTAL			
					THIS MONTH		LAST MONTH	
	Melting	Molding	Cores	Milling	Amount	Cost per 100 lbs.	Amount	Cost per 100 lbs.
REPAIR								
Cupola								
Core Ovens								
Flasks								
Flasks Weights								
Pattern								
Bottom Boards								
Core Boxes								
Equipment								
Machinery								
Boilers and Tanks								
Engines Pumps and Connections								
Tools								
Belting								
Total								
MAINTENANCE								
Buildings								
Sewers Watermains Artesion Wells								
Sprinkler System								
Heating and Ventilating								
Lubricants								
Tools and Miscellaneous Supplies								
Total								
Total Repairs and Maintenance								

EXHIBIT "C"	DEPARTMENTAL GENERAL EXPENSE				TOTAL			
					THIS MONTH		LAST MONTH	
	Melting	Molding	Cores	Milling	Amount	Cost per 100 lbs.	Amount	Cost pe 100 lbs
GENERAL EXPENSE								
Superintendent and Foremen								
Clerks and Timekeepers								
General Works Expense								
Steam Expense								
Water Expense								
Light Expense								
Yard Switching								
Stable Expense								
Power Expense								
Docks Roads etc								
Inspection								
Total General Expense								

Works Form 1. 4M-5-29-06.

Malleable Iron Casting Cost Sheet

INTERNATIONAL PRINT SHOP.

Production	Pcs.	Average Weight Each
This Month	Lbs.	This Month
Last Month	"	Last Month
Mold. Mach.	%	

METALS	Percentage of Metal Charge	Weight Lbs.
PIG		

Works Form 1 4M 5-29 06

Malleable Iron Casting Cost Sheet ________ Works Month ________ 19__

INTERNATIONAL PRINT

Production	Pcs	Average Weight Each	Lbs.	Cost per 100 Lbs.		THIS MONTH	LAST MONTH
This Month	Lbs.	This Month		This Month	Average No. Days Worked		
Last Month	"	Last Month		Last Month	Average No. Men Employed		
Mold. Mach	%						

METALS		Percentage of Metal Charge	Weight Lbs	Price	Amount $	Stock Per 100 Lbs.	Cost Per 100 Lbs	LAST MONTH PRACTICE Cost Per 100 Lbs.	LAST MONTH PRACTICE Stock Per 100 Lbs.	LAST MONTH PRACTICE Percentage of Metal Charge
PIG										
Total Pig										
SCRAP										
Total Scrap										
GROSS METAL										
SCRAP PRODUCED										
Defective Castings										
Sprue, Spill, etc.										
Drop										
Less Scrap										
NET METAL										
PRODUCT										
LOSS										
MELTING										
Coal										
Wood — Charcoal										
Productive Labor	Exhibit A									
Repairs and Maintenance	" B									
General Expense	" C									
			Total (red ink)							
MOLDING										
Sand										
Nails										
Productive Labor	Exhibit A									
Repairs and Maintenance	" B									
General Expense	" C									
			Total (red ink)							
CORES										
Fuel (Coal, Coke, Oil)										
Sand										
Rosin										
Flour										
Core Compound										
________ Oil										
Nails — Wire										
Productive Labor	Exhibit A									
Repairs and Maintenance	" B									
General Expense	" C									
			Total (red ink)							
HARD MILLING										
Productive Labor	Exhibit A									
Repairs and Maintenance	" B									
General Expense	" C									
			Total (red ink)							
ANNEALING										
Pots and Bottoms										
Less Pots and Bottoms Scrapped			(red ink)							
Fuel (Coal, Oil)										
Sand — Clay										
Packing										
Productive Labor	Exhibit A									
Repairs and Maintenance	" B									
General Expense	" C									
			Total (red ink)							
SOFT MILLING										
Productive Labor	Exhibit A									
Repairs and Maintenance	" B									
General Expense	" C									
			Total (red ink)							
FUNDS										
TOTAL COST										

	PRACTICE THIS MONTH TONS	PRACTICE THIS MONTH %	PRACTICE LAST MONTH TONS	PRACTICE LAST MONTH %
Jobbing Castings				
Machine Castings				
Scrap, Sprue, etc.				
Loss				
TOTAL				

RECAPITULATION OF COST	THIS MONTH AMOUNT	THIS MONTH COST 100 LBS.	LAST MONTH AMOUNT	LAST MONTH COST 100 LBS.
Metal Charge				
Other Material				
Productive Labor				
Repairs				
Maintenance				
General Expense				
Funds				
TOTAL				

Works Form 5. 4M-5-29-06.

Malleable Exhibit "A"

PRODUCTIVE LABOR	PIECE WORK	DAY
	AMOUNT	AM
MELTING		
Ch'ging Frncs. & Filling Sprue Bxs.		
Firemen		
Coal Wheelers		
Iron Wheelers		
Slag Mill Labor		
General		

MC

S

Malleable Exhibit "A" ______ Works Month of ______ 19

PRODUCTIVE LABOR	Piece Work	Day Work	General	TOTAL			
				THIS MONTH		LAST MONTH	
	Amount	Amount	Amount	Amount	COST PER 100 LBS.	Amount	COST PER 100 LBS.
MELTING							
Ch'ging Frncs. & Filling Sprue Bxs.							
Firemen							
Coal Wheelers							
Iron Wheelers							
Slag Mill Labor							
General							
Total							
MOLDING							
Molders							
Chill Shellacers							
Ladle Daubers							
Mold Carriers							
Runners							
Sweepers							
Total							
CORES							
Core Makers							
Oven Tenders							
Sand Mixers							
Core Carriers and Unloaders							
Wire Boys							
Miscellaneous, Sweepers, etc.							
Total							
HARD MILLING							
Millmen							
Laborers (Shaking Out and Del. Castings to Mills)							
Laborers (Gen'l) and Elevator Men							
Trimmers							
Sweepers							
Total							
ANNEALING							
Packers							
Dumpers (Separating Castings from Packing)							
Firemen							
Laborers							
Sweepers							
Total							
SOFT MILLING							
Mill Men (Deliver to and from Mills)							
Sorters							
Laborers							
Total							
Total Productive Labor							

WORKS FORM 6.

INTERNATI

Malleable Iron—Exhibit "B" and "C"—

EXHIBIT "B"	DEPARTMENT	
	Melting	Molding
REPAIRS		
Melting Furnaces		
Annealing Furnaces		
Flasks		
Flasks Weights		
Patterns		
Bottom Boards		

Works Form 6

INTERNATIONAL HARVESTER COMPANY

Malleable Iron Exhibit "B" and "C" Works. Month 19

EXHIBIT "B"	DEPARTMENTAL REPAIRS AND MAINTENANCE						TOTAL			
							THIS MONTH		LAST MONTH	
	Melting	Molding	Cores	Hard Milling	Annealing	Soft Milling	Amount	Cost per 100 lbs.	Amount	Cost per 100 lbs.
REPAIRS										
Melting Furnaces										
Annealing Furnaces										
Flasks										
Flasks Weights										
Patterns										
Bottom Boards										
Core Boxes										
Core Ovens										
Equipment										
Machinery										
Boilers and Tanks										
Engines Pumps and Con										
Tools										
Belting										
Total										
MAINTENANCE										
Buildings										
Sewers Watermains Artesian Wells										
Sprinkler System										
Heating and Ventilating										
Lubricants										
Tools and Misc. Supplies										
Total										
Total Repairs and Maintenance										

EXHIBIT "C"	DEPARTMENTAL GENERAL EXPENSE						TOTAL			
							THIS MONTH		LAST MONTH	
	Melting	Molding	Cores	Hard Milling	Annealing	Soft Milling	Amount	Cost per 100 lbs.	Amount	Cost per 100 lbs.
GENERAL EXPENSE										
Superintendent & Foremen										
Clerks and Timekeepers										
General Works Expense										
Steam Expense										
Water Expense										
Light Expense										
Yard Switching										
Stable Expense										
Power Expense										
Docks Roads etc										
Inspection										
Total General Expense										

NY

HEET

Works 1 [illegible]

INTERNATIONAL HARVESTER COMPANY

COMPARATIVE MALLEABLE FOUNDRY COST SHEET

Malleable Iron — Month March 190 — All Works

	Champion		Deering		McCormick		Osborne	Do.	Do.
COST PER 100 LBS.	February	March	J	M	J	M			
MELTING									
Fuel									
Sundry Supplies									
Productive Labor									
Repairs and Maintenance									
General Expense									
TOTAL									
MOLDING									
Sand									
Facing									
Sundry Supplies									
Productive Labor									
Repairs and Maintenance									
General Expense									
TOTAL									
CORES									
Fuel									
Sand									
Sundry Supplies									
Productive Labor									
Repairs and Maintenance									
General Expense									
TOTAL									
HARD MILLING									
Productive Labor									
Repairs and Maintenance									
General Expense									
TOTAL									
ANNEALING									
Pots and Bottoms									
Fuel, Oil									
" Coal									
Packing									
Sand									
Sundry Supplies									
Productive Labor									
Repairs and Maintenance									
General Expense									
TOTAL									
SOFT MILLING									
Productive Labor									
Repairs and Maintenance									
General Expense									
TOTAL									
FUNDS									
TOTAL COST ABOVE NET METAL									
PRACTICE									
Good Castings (Net Ton)									
Scrap "									
Loss "									
Total "									
Av. Wt. of Cstgs—Lbs									
Average No. of Men Employed									
" " " Days Worked									
Molding Machine Production									
Hand Pattern Production									
PER CENT OF METAL CHARGE									
Pig Iron									
Scrap									
Gross Metal									
Scrap Produced									
Net Metal									
Good Castings Produced									
Loss									
STOCK PER 100 LBS.									
Pig Iron									
Scrap									
Gross Metal									
Scrap Produced									
Net Metal									
Fuel for Melting									
Molding Sand									
AVERAGE PRICE OF MATERIAL									
Pig Iron Gross Ton									
Scrap Net Ton									
Gross Metal "									
Scrap "									
Net Metal "									
Fuel (Melting) "									
Sand (Molding) "									
RECAPITULATION—Cost Per 100 Lbs.									
Pig Iron									
Scrap									
Gross Metal									
Scrap Produced									
Net Metal									
Other Materials									
Productive Labor									
Repairs and Maintenance									
General Expense									
Funds									
TOTAL COST									

INTERNATIONAL HARVESTER COMPANY

COMPARATIVE GREY IRON FOUNDRY COST SHEET

Month ____________ 190

Grey Iron

All Works

COST PER 100 LBS

MELTING
- Fuel
- Sundry Supplies
- Productive Labor
- Repairs and Maintenance
- General Expense

Total

MOLDING
- Sand
- Facing
- Sundry Supplies
- Productive Labor
- Repairs and Maintenance
- General Expense

Total

CORES
- Fuel
- Sand
- Sundry Supplies
- Productive Labor
- Repairs and Maintenance
- General Expense

Total

MILLING
- Productive Labor
- Repairs and Maintenance
- General Expense

Total

FUNDS

TOTAL COST ABOVE NET METAL

PRACTICE
- Good Castings (Net Ton)
- Scrap "
- Loss "

Total

- Av. Wt. of Cstgs—Lbs. each
- Average No. of Men Employed
- " " " Days Worked
- Molding Machine Production
- Hand Pattern Production

PER CENT OF METAL CHARGE
- Pig Iron
- Scrap
- Gross Metal
- Scrap Produced
- Net Metal
- Good Castings Produced
- Loss

STOCK PER 100 LBS.
- Pig Iron
- Scrap
- Gross Metal
- Scrap Produced
- Net Metal
- Fuel for Melting
- Molding Sand

AVERAGE PRICE OF MATERIAL
- Pig Iron Gross Ton
- Scrap Net Ton
- Gross Metal "
- Scrap "
- Net Metal "
- Fuel (Melting) "
- Sand (Molding) "

RECAPITULATION—Cost Per 100 Lbs.
- Pig Iron
- Scrap
- Gross Metal
- Scrap Produced
- Net Metal
- Other Materials
- Productive Labor
- Repairs and Maintenance
- General Expense
- Funds

Total Cost

IV.

A GENERAL SYSTEM FOR A MEDIUM SIZED WORKS.

For such a system for cost keeping in a medium sized manufacturing works the factory accounting is kept wholly separate from the commercial accounting, as if these two departments were independent and under different heads.

The factory accounting is kept at the works while the commercial accounting is kept at the head office. The head office treats the factory accounts as a sub-division ~~of~~ its accounts.

The sole duty of the factory end of the business is to fill orders sent out by the head office, and to fill such orders with dispatch and with economy; the factory sending to the head office the bills of lading for finished orders with labor loading cost as selling price to the head office. The prices which the head office is to pay the factory for the various styles of machines manufactured, and the piece prices of details and repairs, are fixed each year from the records of the factory cost book of the previous year, and the head office must keep the factory's bank account good.

The amount of surplus or deficiency in the factory's bank account is profit or loss at the factory and is so entered on the books in the head office. Thus there is no accounting relation between factory and head office.

The factory is merely the servant of the head office, furnished with capital against its production, and detailed

to the performance of special duties, having certain discretionary powers which leave to the factory the detailing of the general directions issued from the head office.

At the factory are located the following officials:

General Factory Manager.
Superintendent.
Assistant Superintendent.
Mechanical Engineer.
Foreman of the Machine Shop.
Foreman of Assembling and Repairs.
Foreman of Foundry.
Foreman of Forge.
Rough Stores Keeper.
Finished Stores Keeper.
Shipping Clerk.
Stores Clerk.
Time Clerk.

GENERAL MANAGER.

All production orders originate in the head office. These orders are given to the general manager and are by him given directly to the factory superintendent without mark, except to check as received. The general manager has the direction of shipments, giving orders to the shipping clerk, also attends to the general business of the factory, keeps up insurance, and authorizes all bills which are to be sent to the head office for approval, and places workmen's pay totals on the pay envelopes. All checks drawn by the factory

against the head office are made as directed by the general manager and are sent to the treasurer of the head office for his signature.

THE SUPERINTENDENT.

The superintendent hires and discharges all factory employees and exercises the usual duties of general labor superintendent. The superintendent issues all purchasing orders and is the acting purchasing agent, purchase orders going to the general manager for his signature. He examines the weekly report made by the cost clerk, and directs the general course of factory production, and all experimental work carried on at the factory. The superintendent makes a weekly and monthly report of assembled machines, and repairs made, and pieces produced, to the general manager, who also receives a daily report made by the foreman of the assembling department.

ASSISTANT SUPERINTENDENT.

The Assistant Superintendent originates factory production orders under supervision of the superintendent, keeps the Shop Productinn Book, checks up all invoices of rough stores as received, as he is the rough stores room keeper and in this capacity delivers to workmen all rough stores on presentation of "Work Cards", and also advises the superintendent as to purchases required. The rough Stores Room Book, debit and credit, and gross time record, is kept by the assistant superintendent, who is located in the office of the superintendent.

FOREMAN OF THE MACHINE SHOP.

The foreman of the machine shop supervises all labor in his department, and upon receiving a Report Card filled by the assistant superintendent, proceeds to fill a Work Card bearing the same number as the Report card. Several forms of work cards are shown mounted under card forms in the back of this paper. The time and date are placed upon the Work Card upon receipt by the foreman, the order being charged with the working time of the Work Card between the time of its tender to the foreman and the time of its acceptance by the assistant superintendent after being filled. The finished stores keeper also keeps a book of debit and credit, each balance showing the number of a certain finished piece in store.

FOREMAN OF ASSEMBLING AND REPAIRS.

The foreman of assembling and repairs has charge of his department, and makes a daily report to the general manager of pieces received, repairs made, and machines assembled.

FOREMAN OF FOUNDRY.

The foreman of the foundry checks sub-Work orders received and pieces produced by him, and supervises all labor in the foundry.

FOREMAN OF FORGE.

The foreman of the forges fills all orders assigned to him and checks time of filling same. He has the regular duties as foreman in his department.

SHIPPING CLERK.

The shipping clerk is the finished stores keeper. He has charge of the shipping room, finished stores, and packers, and is chief inspector. He has under him an assistant inspector who is also a packer. The shipping clerk receives his orders from assistant superintendent. He then enters the order on the shipping book, which is the final order book, and fills it from finished stores if possible; if not, the shipping clerk enters the order in one synoptic line on the superintendent's work book and the superintendent then issues a production order, and places the order in work in the factory.

COST CLERK.

The cost clerks duty is to figure prime costs of goods in the factory, (Form) and are kept in his book, reports being filed weekly and months to the general manager.

TIME CLERK.

The time clerk has charge of the mechanical time recorders, if used, and it is economy to do so; he checks all time off filling orders, and the time cards of the different departments. He records the actual working time of all machines and tools used in the factory, and actual working time to fill all orders, also he keeps a time book holding these various items and makes detailed and summarized reports to the general manager weekly and monthly.

His time clerk occupies an office of prime importance in the factory cost accounting.

Books kept in addition to all time and card records, are as follows:

Rough Stores Book, kept in rough stores toom, debit and credit.

Finished Stores Book, kept in finished stores toom, debit and credit.

Time Book.

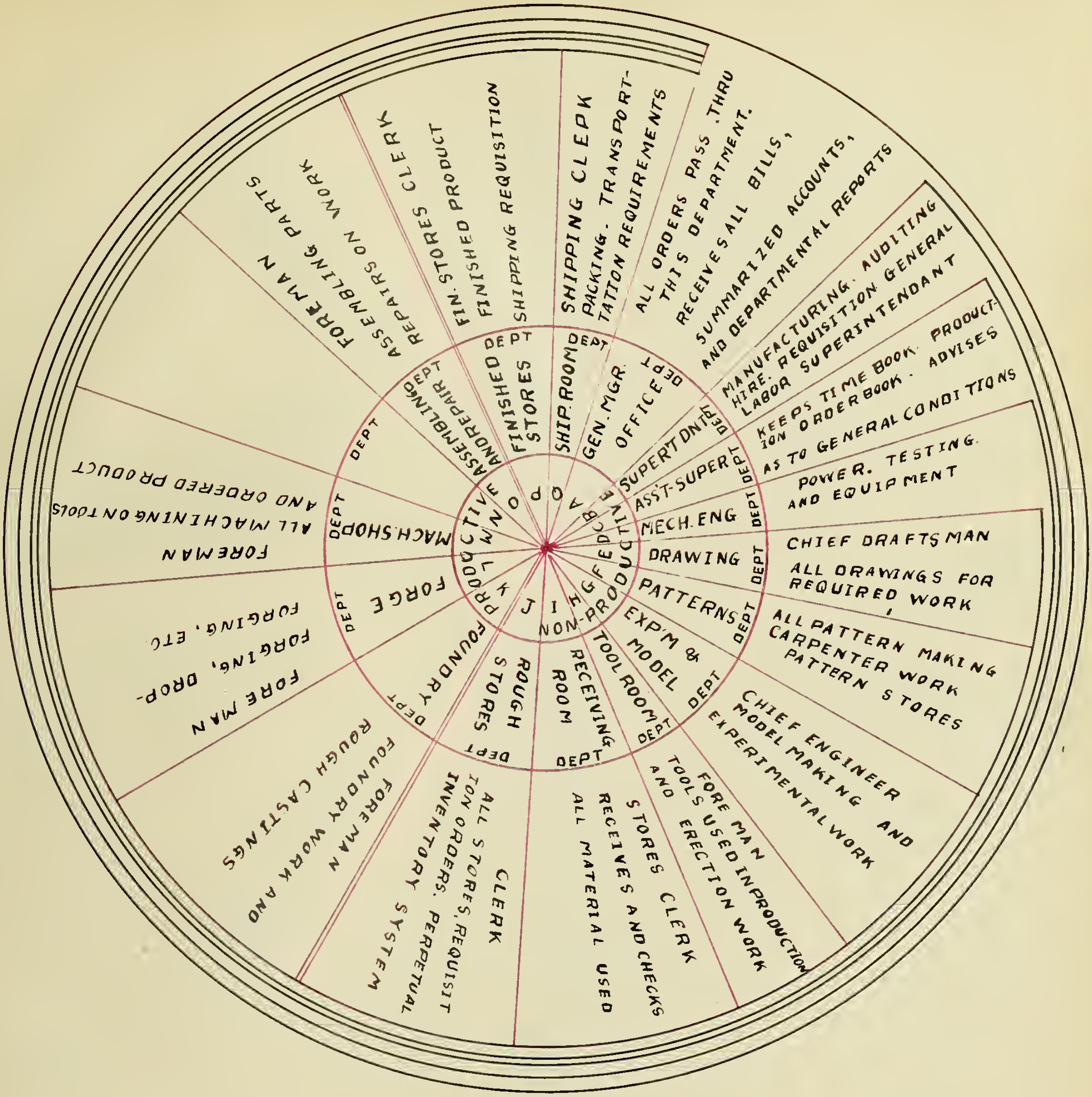
Prime Cost Book, kept by Cost Clerk.

Piece Work Book, kept by Cost Clerk.

Invoice Book, kept by Cost Clerk.

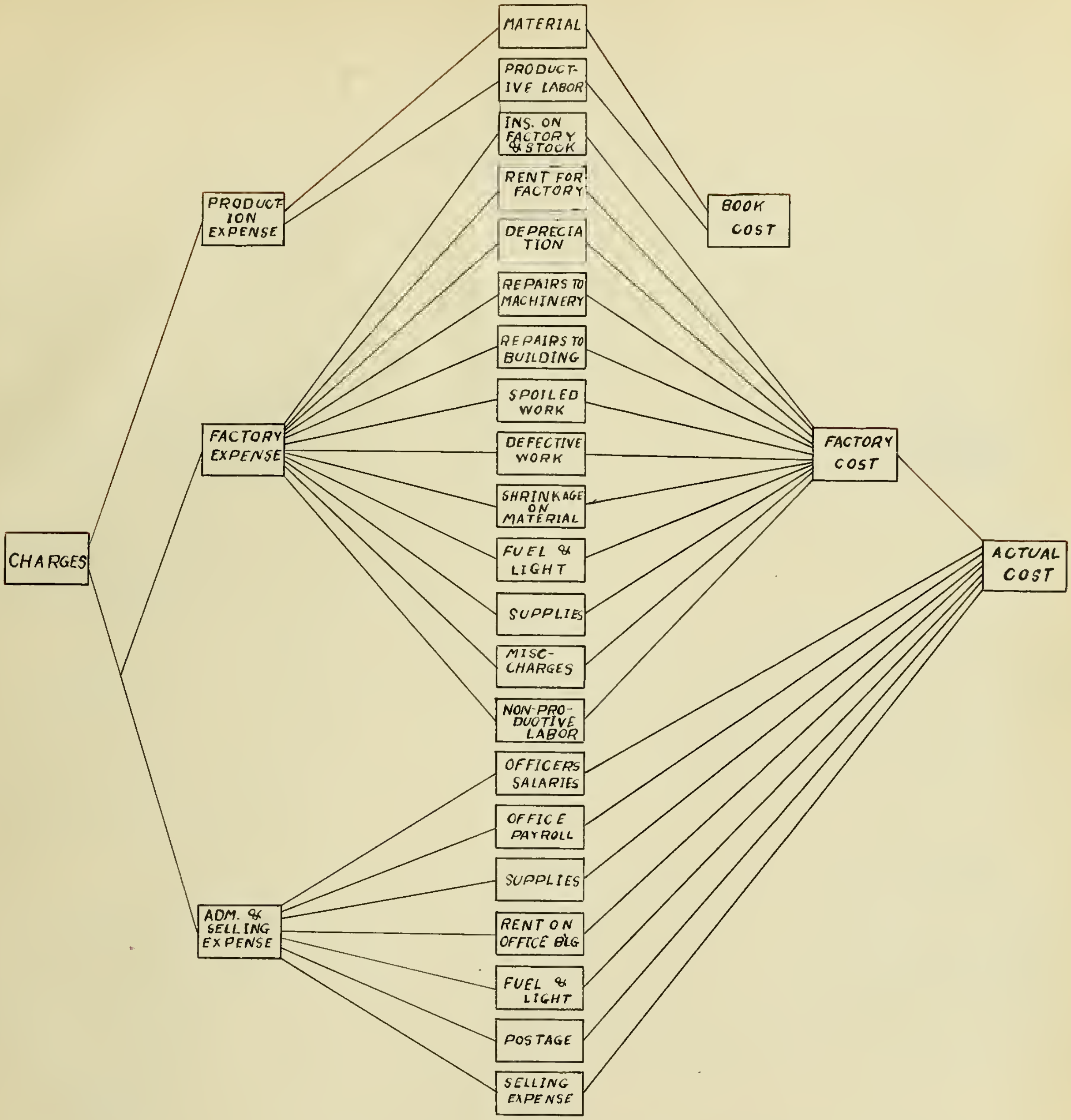
Shop, Order Book.

General cost forms and blanks are same as described under types of cost keeping systems page 17-20 and shown graphically on pages 21 - 27 under (b) II.



Graphical chart showing the grouping of factory departments and their respective heads in their order of importance. The large circle represents the factory total, then comes the various departments as outlined in the preceding discussion.

The departments coming under the head of productive labor as shown in the small circle are subject to some change in different factories but the departments under non-productive labor remain the same for every factory.



Graphical chart by J. P. Blahee in System. Application of General burdens, in accounting system; it gives a classification of the charges which are to be charged to the factory and shows how these charges make up the cost of the product.

IV.

CONCLUSION.

It is a universally recognized fact that each manufacturing plant is unique in itself and possesses some features distinct from any other establishment. It is therefore essential that each manufacturer should have a cost keeping system adaptable to his own particular requirements. This individuality of cost records or other records can best be attained by the card system of accounting.

It seems at first sight that it is an easy matter to determine the cost of any article that passes through a factory but when it comes to charging off hand profit and loss, the difficulty begins.

The factory cost records must show to the manager the exact actual condition of values under his control. The four systems described are in actual use by prosperous plants and a careful study of them will familiarize one with conditions to be met in his own undertaking.

From considering the forms displayed, in use by modern firms and from a study of systems of cost accounting by the best authorities on the subject, a general plan has here been designed for keeping factory costs. This system has not dealt with the various sub-cost cards for factory use but only those most prominent in determining labor cost and cost rate to be fixed on machines and tolls used in the factory. These forms can be easily changed to suit the requirement of any factory and from them and from a study of actual forms used, and any additional cards may be made.

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